THE

LONDON JOURNAL

OF

Arts and Sciences;

CONTAINING

FULL DESCRIPTIONS OF THE PRINCIPLES AND DETAILS OF

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ALSO

Original Communications

ON OBJECTS CONNECTED WITH

SCIENCE AND PHILOSOPHY,

PARTICULARLY SUCH AS EMBRACE THE MOST RECENT

INVENTIONS AND DISCOVERIES

IN

Practical Mechanics.

BY W. NEWTON,

CIVIL ENGINEER AND MECHANICAL DRAFTSMAN.

VOL. VIII.

[SECOND SERIES.]

London:

PUBLISHED BY SHERWOOD, GILBERT AND PIPER PATERNOSTER ROW; SIMPKIN AND MARSHALL, STATIONERS' COURT; AND W. NEWTON, OFFICE FOR PATENTS, 66 CHANCERY LANE.

1832.

LIST OF PLATES TO VOL. VIII.

SECOND SERIES.

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TO VOL VIII.

Guthrie, Printer, 15, Shoe Lane, Fleet Street.

THE

London

JOURNAL OF ARTS AND SCIENCES.

No. XLIII.

[SECOND SERIES.]

Recent Patents.

To William Church, *of Haywood House, Bordsley Green, near Birmingham, in the county of Warwick, Esq. for his having invented or discovered certain improvements in apparatus applicable to propelling boats, and driving machinery by the agency of steam; parts of which improvements are also applicable to the purposes of evaporation.*—[Sealed 29th November, 1830.]

The Patentee has arranged these improvements under the five following heads: 1st, the construction of furnaces for heating boilers, whereby a more perfect combustion of the fuel is obtained; 2nd, in the apparatus employed in supplying boilers with water; 3rd, in the construction of boilers; 4th, in the construction of steam

engines properly so called; and 5thly, in the application of apparatus for recovering the heat that has been employed in generating steam or vapour, and thus economising fuel in all purposes of evaporation, the particulars of which will be understood by reference to the drawings.

"Plate I. fig. 1, is an isometrical representation of a furnace attached to a boiler; A, A, is the outside or case, containing water and steam; the internal construction of the furnace will be best understood by reference to the vertical section, fig. 2, which is taken through the middle.

"In this figure it will be perceived, that the coals represented as resting upon the fire bars G, G, were introduced down through a conical tube Z, situated at the top of the furnace. The ash pit being closed, and the air for supporting combustion being conveyed in through the annular blast orifice Y, Y, the smoke is driven down among the ignited fuel, and the gases of combustion pass off through the fire flue in or under the boiler. Opposite to the fire flue is a small door H, carefully fitted to make it air tight; this door furnishes the means of removing cinders, and cleansing the flue; the door of the ash pit is also made air tight. By a careful inspection of the figures, the form and construction of the furnace will be apparent.

"The apparatus for supplying the boiler with water is shown on the left hand in fig. 2, situated in the enlarged end of the feed pipe I, which is nicely bored to receive it; J, is a cylinder, which is perforated longitudinally with four holes, as shewn in the plan fig. 3, two of these holes are seen at *a, a*, fig. 2, coinciding one with the lower end of the steam pipe *b*, and the other with the water pipe *c*; a disc of metal perforated with one hole at *d*, is

made water tight by means of packing on the edge and held up against the end of the cylinder J, by the helical spring *e*. The ends of the cylinder J, must be well fitted to the cover K, and also to the disc *d*.

"Rotary motion is communicated to the cylinder J, through its shaft L; this motion may be either uniform or interrupted, but the latter is preferable. The action is as follows:—

"As the cylinder J, revolves, the holes *a*, are brought successively under the water pipe *c*, and the steam pipe *b*, alternately. While under the water pipe *c*, the water (being situated higher than the cylinder J,) descends, and fills the hole *a*, and is carried round in it until it coincides with the hole *d*, in the disc, and also with the steam pipe *b*, over it. The water will descend until it finds the level of the water in the boiler, and the space will be occupied by steam, which in its turn will be carried round until it is brought under the water pipe *c*, when the steam will be immediately condensed, and the space will be again filled with water. Thus it will be perceived, that the quantity of water introduced at each revolution of the cylinder J, will be regulated by the height of the water in the boiler, and that a float in the boiler becomes unnecessary.

"Fig. 1, is an isometrical representation of the furnace A, A, A, already described, connected to a boiler, steam reservoir, &c. The boiler, properly so called, represented in this figure, being partly in section, is seen to consist of four cylindrical tubes B, C, D, E, arranged one within another, the spaces between the tubes B, and C, and between the tubes D, and E, are occupied by water, and the tube B, and the spaces between the tubes C, and D, and between the tubes E, and F, constitute the fire flues: through which the flame and heated gases generated in

the furnace circulate. The connexion of the fire flue B, with the furnace, and the connexion of the tube C, with the jacket or case of the furnace, will be clearly seen in the sectional drawing, fig. 4, in which the course of the circulation of the fluids or vapours contained in the apparatus is also shewn.

"The flame generated in the furnace as before described, is driven along the tube B, figs. 1, and 4, until it arrives at the opening M, that communicates with the space between the tubes C, and D, as shewn in fig. 4, and also in the isometrical drawings at M, in fig. 5, through which opening the flame and heated vapour passes into the space between the tubes C, and D, seen best in fig. 4. This space is divided longitudinally by three ribs or partitions, 1, 2, 3, shewn in fig. 5, consequently the flame is made to traverse the length of the boiler three times before it leaves the space between the tubes C, and D. On leaving the space between the tubes C, and D, it passes into the space between the tubes E, and F, through which it makes its exit.

"The boiler is supplied with water from the water surrounding the furnace and through the pipe L, as shewn in figs. 1, and 4. The steam generated from the water contained in that portion of the boiler, formed by the space between the tubes D, and E, passes off into the steam reservoir N, fig. 1, through the pipe K, and the steam generated in the inner portion of the boiler, that is to say in the space between the tubes B, and C, passes off through the water in the furnace at O, and from thence into the reservoir N, at P, as seen in fig. 1.

"The construction and action of the boiler, properly so called, having been described, together with the course of the fire flues in the same, I shall proceed to particularize the action of that part of the apparatus in which

the atmospheric or other air gas or vapour abstracts the heat from the eduction steam after the said steam has given motion to the engine.

"The atmospheric or other air, gas or vapour is forced by a blowing machine, or other proper means, into the apparatus surrounding the boiler, through the pipe, into the space between the tubes I, and H, in fig. 4, and pursues the course indicated by the arrow, as seen in figs. 1, and 4, turning round the end of the tubes H, and G, into the space between the tubes G, and F, and proceeding through the pipe or tube R, it is conducted in a heated state into the annular blast orifice Y, Y, shewn in section in fig. 2.

"The eduction steam is conducted from the engine by tube S, in fig. 4, between the tubes H, and G, and round the lower ends of the tubes H, and I, into the space between the tubes I, and J, and that portion of the steam which is not condensed, together with the permanent gases contained in the steam, escape from the apparatus at T, figs. 1, and 4, while the products of condensation are conducted from the refrigerating or cooling apparatus into the furnace or boiler through the pipe U, fig. 4.

"In figs. 1, and 4, are represented one mode of constructing the boiler, with its furnace and refrigerating apparatus attached. Figs. 2, and 6, exhibit a variation of the construction; and although in these figures I have shewn the refrigerating apparatus as attached to or surrounding the boiler, yet the refrigerating apparatus may be distinct from the boiler: proper passages or channels being constructed therein to receive the vapours or gases from the fuel after they have left the boiler, properly so called; and also suitable passages being constructed for the entrance of the atmospheric or other air, gas or vapour employed for the abstraction of the heat, and likewise for

the entrance of the eduction steam into the apparatus, where all or part of the steam becomes reduced to water, while the atmospheric or other air, gas or vapour becomes heated by the absorption of that heat, which had previously existed in the steam, together with the heat existing in the gas or vapours, which have been conducted from the fire flues surrounding the boiler, properly so called.

" The water guage *a*, shewn at fig. 1, on the furnace, is furnished with a piston, for the purpose of keeping it clear and transparent, and of thus shewing, by inspection, the height of water in the boiler.

" My improvements in the construction of steam engines, properly so called, are delineated in Plate II. in which the same letters refer to the same parts of the machinery in all the figures ; fig. 1, is a side elevation ; fig. 2, an end elevation ; and fig. 3, a plan of the engine.

" The frame work A, A, standing on the broad base B, B, supports the crank shaft C, on which is the fly wheel D, D. The cylinder E, vibrates with the rotation of the crank F, F, and is supported at the bottom by two strong hollow journies, working on bearings G, G, situated on the base B, B. The construction of the cylinder bottom, on which the said hollow journies are formed, will be best understood by referring to figs. 4, 5, and 6, in which the steam and eduction passages are shewn. The steam from the pipe H, figs. 2 and 5, enters the hollow journey *a*, and proceeding through one of the passages shewn in dotted lines in the cylinder bottom I, fig. 6, finds its way into the steam chest, shewn in section at J, in figs. 6 and 8. In fig. 8, the slide valve *b, b*, is also seen, but being similar in construction and operation to those in ordinary use, it will require no further description.

" After the steam has been admitted into the cylinder E, and performed its office there, it passes through the eduction passages *c, c,* into the jacket K, K, of the cylinder, from whence it escapes through the eduction passage in the cylinder bottom I, fig. 6, into the eduction pipe L, figs. 1, 2, 5, 10, and 12, whence the steam is conveyed to the air heating apparatus.

" The contrivance for working the slide valves is shewn in figs. 1, 2, and 3. The lever M, on the way shaft N, is connected to the valve rod O, by means of the hinge P; another lever Q, fixed on the way shaft N, is connected by a moveable joint to the rod R, which rod is attached at the lower end by a moveable joint to the bracket S, S, and held in a position oblique to the axes of the cylinder, as shewn in fig. 1. Now, as the way shaft N, has its bearings in the guides T, T, which are firmly attached to the top of the cylinder E, and consequently vibrates with it, it will be perceived that at each vibration the end of the lever Q, will be either raised or depressed, by which means the slide valve is alternately drawn up and pushed down. The bracket S, S, before mentioned, extends equally on each side of the centre of the cylinder, and has a groove through nearly its whole extent, in which the pin that connects the rod R, to the bracket S, S, is fixed in such manner that it may be slidden along from one end of the groove to the other, by means of the handle J. In this way a reverse motion may be immediately given to the engine.

" It has been before observed, that the cylinder vibrates to conform to the position of the crank, consequently a connecting rod is dispensed with, and the piston rod is connected immediately with the crank brasses U, U, fig. 9; but in order to relieve the piston rod from any lateral strain, I attach to the top of the cylinder the

guides T, T, through which the squares on the ends of the crank brasses U, U, slide freely.

"By a careful inspection of figs. 5, 6, 7, and 8, it will be perceived that the strong parts V, V, of the journies rest in bearing on the frame work, entirely independent of the steam joints formed between them, and the pipes H, and L.

"In a line with the bearings G, G, are circular openings *d*, *d*, in the frame work, into which the ends of the hollow journies extend through the accurately faced plates *e*, *e*. Against these plates, the small stuffing boxes *f*, *f*, seen on a larger scale in fig. 7, are held by means of springs *g*, *g*, the faces of the stuffing boxes being accurately ground to the plates to form a steam tight joint. The holes through the plates *e*, *e*, should be somewhat larger than the pipe ends of the journies, to allow for wearing down.

"In order to regulate the speed of the engine, I cause the throttle valve to be fully shut, at an earlier or later period of the stroke, as the case may require. To effect this, I have recourse to the following means:—as the wheel W, fixed on the main shaft C, revolves, the tappets *h*; *h*, attached to the wheel W, come in contact with a tooth on the rod *i*, and draw it up; the throttle valve being connected by means of the levers *j*, and *k*, and the sling *l*, to the rod *i*, is thereby opened. The shutting is effected in a similar manner, that is to say, the tappets *m*, *m*, situated on arms extending from the branch X, coming in contact with the tooth on the rod *i*, before mentioned, push it down, and thus the valve is again closed.

The action of the two pairs of tappets *h*, *h*, and *m*, *m*, upon the rod *i*, will be best understood by reference to figure 11, in which it will also be seen by the dotted lines, that their relative position may be varied. This

variation is produced by the governor Y. The barrel X, is connected to the main shaft C, by means of the bolt *n*, which is made to slide freely in the groove *o*, and its tooth *p*, belonging to the bolt *n*, fitting the spiral groove *r*, in the barrel X, causes the barrel to revolve on the main shaft C, as the bolt is made to slide to and fro by the lever Z, Z, connected with the governor, and thus the intermediate spaces between the opening tappets *h*, *h*, and shutting tappets *m*, *m*, are varied.

"The isometrical drawing, fig. 12, exhibits one of the modes of economizing fuel in those processes of evaporation, called distillation and rectification: B, being the still heated by means of steam admitted between the still, and a case which surrounds it, and A, the pipe to admit steam for this purpose; or the still may be heated by any other means. The vapour generated from the wash contained in the still, passes along the neck O, of the still into a spirally formed passage or channel in the vessel E. The passage or channel contains atmospheric air, or any gas or vapour, or a mixture of gas or vapours, which increase or support combustion. The vessel E, is shewn with its top removed to exhibit its internal construction, and it will be observed that the atmospheric or other air, gas or vapour, which enters the apparatus E, at the tube marked D, and the vapour from the still which enters the apparatus E, through the tube C, pass through their separate and respective channels in opposite directions.

"The two spiral passages in the vessel E, are formed of two thin sheets of metal, or other suitable material coiled round each other, at proper distances as under, and extending throughout the whole depth of the vessel. The sheets are firmly united at their edges by soldering, or otherwise to the top and bottom, so as to be perfectly

air tight. The tube C, forms the neck or adapting tube of the still; between the still and the refrigerating vessel H, is the worm tub of the ordinary construction, which constitutes no part of my claim.

"The mode of operation with this apparatus is as follows:—

"The still being heated either by steam, admitted round it through the pipe A, or by any other means, the vapour which is generated from the wash contained in the still, passes into the vessel E, through the pipe C, near the centre of the bottom, and along the spiral passage, until it arrives at the end of that spiral passage or channel, where it passes into the worm tub at the part marked G. At the same time that the vapour from the still is entering the vessel E, as before described, atmospheric or other air, gas or vapour, is caused to enter the vessel E, through the tube or pipe D, by means of a blowing, exhausting or other proper apparatus.

"The atmospheric or other air, gas or vapour, becomes heated in its passage along the spiral channel before described, and it then escapes from the apparatus E, through the tube F, whence it is conducted in a heated state to supply the fuel, with air or gas for its combustion.

"The velocity of the atmospheric or other air, gas or vapour, through the vessel or apparatus E, must be regulated by the strength of the spirit, which it is intended to obtain by the rectification or distillation, for when strong spirit is required such a quantity of air, gas or vapour, must be forced through the apparatus E, as will cause the watery and empyreumatic particles to be condensed before they arrive at the entrance G, of the worm tub H.

"The watery and the empyreumatic particles which existed in the vapour from the still, having become con-

densed, trickle or run down the upright sides of the spiral passages or channels, in the vessel or apparatus E, and either return wholly or in part, as may be most desirable into the body of the still; the spirituous vapours passing into the worm tub, become condensed in the usual manner, or the spirituous vapour may pass into an apparatus similarly constructed to that marked E, on the drawing, and thus render a worm tub unnecessary.

"Having thus, in pursuance of the conditions in which His Majesty was graciously pleased to grant me and my heirs and assigns his Royal Letters Patent, particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I do in conclusion desire it to be understood, that I claim as herein before set forth in my description and drawings, and as parts of my invention, the employment of apparatus whatever may be its form, for causing a current of air, gas or vapour, to abstract heat from vapour generated in boilers, stills, or other vessels used in raising substances, by means of heat to a gaseous, vaporous or elastic state, and making use of such air, gas or vapour (when and after it shall have thus abstracted heat) for the purposes of evaporation. But although I claim as above certain improvements as applicable to the purposes of evaporation, including those hereinbefore described, by which the aforesaid improvements may be applied in a novel and useful manner to boats and other machinery through and by the agency of steam, yet I do not confine my claim to any given form of apparatus, as the form may be varied in the construction of the steam engine or the boilers, or vessels of the brewer, chymist, distiller, rectifier, salt or soap manufacturers, or refiners of sugar, and so forth, as may be found most convenient in their different processes of vaporisation. To make the nature

of my invention clearly and particularly known, I have given drawings and descriptions of the steam engine and the still, as most easily understood and most practically useful, while at the same time they afford every facility for the applicaction of the principles of my invention.—[*Inrolled in the Rolls Chapel Office, May,* 1831.]

Specification drawn by the Patentee.

The Specification of this Patent embraces some features of a very curious and novel character, which appear to emanate from a careful study of philosophical principles, and an ingenious adaptation of those principles to practical uses; and if on trial they should be found to effect the objects which the Patentee anticipates (of which we see no reason to express a doubt), they certainly will lead to some of the most important results connected with modern science.

In the application of these principles, either to the steam engine or to any process of distilling or evaporating, they will be found, we have reason to think, of great practical utility, and lead to results that have hitherto been looked upon as wholly unattainable. The late Dr. Young, in treating of the steam engine, gives a useful caution to those who are preparing to appreciate the various improvements made in it from time to time, viz. to discriminate between the effects which are the results of newly discovered philosophical principles, and those which are only attained solely from a high perfection of mechanical execution.

Great as the ingenuity of the mechanical part of this invention unquestionably is, we consider it very subordinate to the novel and scientific principle on which the steam is generated with such rapidity and safety; but the most extraordinary part is, after the steam has done its

work, paradoxical as it may seem, it is made to return the greater part of its heat again to the boiler, without employing any fuel whatever, or any portion of the power of the engine for conducting the heat so returned.

Since the whole of the heat thus returned to the boiler costs nothing for fuel, it produces, of course, an essential reduction in the weight and bulk of the coals, that have hitherto been indispensably necessary for steam boats.

One of the best articles on this subject that has fallen under our observation, is that contained in the last supplement to the Enclyclopædia Britannica, from which we have made the following extract:—

"The prodigious consumption of coals by the furnaces of the boilers, proves a great hinderance to the extension of steam navigation. The store of this ponderous species of fuel required for the supply of the engine on a distant voyage, would occupy the whole tonnage, even of a large vessel. The *Rapid* steam vessel, of 130 tons burden, and 60 horse power, required nearly a ton of coals every two hours, and could not, therefore, continue at sea above eleven days, and unless some great discovery indeed be made on the concentration of heat, we shall never dispatch steam packets directly to the East or West Indies."

By means of Dr. Church's method of returning the greatest portion of the heat of the steam, after it has acted upon the piston back again to the boiler, there is no doubt that steam packets may be dispatched with perfect safety to the West Indies, at an average rate of from two to three hundred miles a day, and to this application of his engines we would recommend his attention, rather than employing them in impelling carriages on common turnpike roads, as we understand he is about doing between Liverpool and Birmingham.

We have repeatedly expressed our scepticism as to

the practicability of carrying heavy weights for long distances, by locomotive engines, on common roads; we have never sayed that it could not be effected, but we have said, and do still say confidently, that it has not yet been done. In Dr. Church's engines great power is concentrated within a very narrow compass, and this certainly lessons our scepticism. It by no means removes it however altogether; and we shall cling to our doubts respecting the employment of steam carriages on ordinary roads, until we see one perform a distance of one hundred consecutive miles, with something like uniformity of progress, and without stopping every few minutes to replenish.

In a steam engine of fifty horse power, on Dr .Church's construction, we understand that no one portion of the engine or boiler weighs more than two hundred weight, and every part of it may be easily taken to pieces, and transported on the backs of mules, and put together and set to work in any place immediately, and without any support but its own frame. It is to be regretted that this ingenious modification of the steam engine was not known five or six years ago, when such enormous sums of money were wasted upon the mines of South America, most of which might have been readily freed from water and kept at work, with the small supply of fuel usually found around them.

To the distillers and West India planters, we think that this new method of evaporating will prove of incalculable value, by enabling them to run off at one operation a spirit of any required strength or purity, with far less fuel than the quantity hitherto employed, and without the possibility of the still running foul, or of its exposure to the various accidents attending the usual modes of distilling and rectifying.

To James Ramsay and Andrew Ramsay, *both of Greenoch, in North Britain, cordage and sailcloth manufacturers, and* Matthew Orr, *of Greenoch, aforesaid, sailmaker, for their having invented or found out an improvement in the manufacture of canvas and sailcloth for the making of sails.*—[Sealed 20th March, 1830.]

It has been found that sails made with the selvages and seams of the canvas running down parallel to their edges, are very apt to bag and become torn in the middle, from the strain to which the sails are subjected by the pressure of the wind. To obviate this inconvenience a mode of making sails with the seams and selvages running diagonally, was proposed by Admiral Brooking, and a patent granted to him for the same on 4th September, 1828, (see the 7th Vol. 2nd Series of our Journal, p. 85.) The invention of Messrs. Ramsay and Orr, which we are about to describe, has a similar object, viz. that of giving additional strength to sails by a peculiar manner of weaving the canvas of which they are made.

The improvement proposed under the present patent, consists in weaving the canvas with diagonal threads; that is, placing the weft yarn or shoot in weaving at an oblique angle to the warp yarns, instead of making the intervention of the warp or weft threads or yarns at right angles to each other, as in the ordinary mode of weaving.

To accomplish this object, the loom must be particularly constructed; that is, its warp and work beams must stand at an oblique angle with the sides of the loom, and the batten and slay must be hung in a particular manner, in order to beat up the weft or shoot in lines ranging diagonally with the warp. No drawing is shewn of the method by which this arrangement of the loom is to be

made, but it is presumed that any weaver would know how to accomplish it; the invention consisting solely in producing sail cloth, with the threads or yarns of the weft ranging diagonally at any desired angle with the direction of the warp thread.—[*Inrolled in the Inrolment Office, September,* 1830.]

To JOSEPH GIBBS, *of Crayford, in the county of Kent, Esq. for his invention of improvements in evaporating fluids, applicable to various purposes.*—[Sealed 6th of November, 1830.]

THE Patentee says that the object of his invention is the economization of fuel, employed in evaporating water or other fluids for the purposes of generating steam, distillation, &c. and he considers that he has accomplished this desirable object, by adding to the bottoms of steam or other proper boilers one or more vertical descending cylinders to contain part of the water or other fluid; or the same effect may be produced by deepening the boiler itself; and into the descending cylinders or deep parts of the boiler, the heated air, vapour and flame from the fire place in or under the said boilers, is to pass by flues in a circuitous or sinuous course, so as to compel the vapour and flame to give out the whole, or nearly the whole of the heat they contained to the water or other fluid surrounding them, before they finally escape; by which means the cold water, or other fluid, which is made to enter the lower part of the cylinders, or descending part of the boiler, becomes gradually and successively heated, in its ascent to the rest of the water contained in the main body of the boiler, from its coming into contact

with continually increasing heat of air and flame from the fire places contained in the circulating flues, and thus the water is made to enter the boilers at a high degree of temperature, whilst any steam which may be generated at the time, unites with the steam in the boilers, and the whole, or nearly the whole of the heat produced by the fuel being so beneficially employed in heating the water, of course, less fuel will be requisite, than when it is consumed in the ordinary manner of heating boilers.

Plate III, fig. 1, is a longitudinal section of a steam boiler *a*, with a descending cylinder *b*, united to its lower part or bottom; this descending cylinder *b*, has a contorted pipe or flue *c, c*. The flame and heated air from the fire place *d*, passes along the horizontal flue, and descends through the contorted flue in the cylinder, and is thence conducted to the chimney, having in their course downwards given out the whole or the greater part of the heat they contained to the water in the descending cylinder.

As it is the natural tendency of heated air and flame to ascend, in order to compel them to take a different course, or to descend in the manner above described, it is necessary to produce an artificial draught or current in the flues and chimney, which should be sufficient to overcome that tendency.

This artificial draught or current may be produced either by means of a blowing or exhausting apparatus, such for instance, as bellows, gasometers, pumps, centrifugal fans, or vanes, actuated by machinery; and which being well known, and not forming any part of this invention, it is not considered necessary to describe it. As however it is important to produce an ascending draught or current in the chimney *f*, on first lighting the fire under the boiler at *d*, in order to get up the steam, and actu-

ate the machinery, a flue *g*, is provided, leading directly to the chimney; but which flue is afterwards to be closed by means of the damper *h*, when such draught or current is produced, and the steam is raised, before proceeding to force the heated air and flame to descend by means of the said blowing or exhausting apparatus. The ash pit door *i*, must likewise be opened when lighting the fire; when this is effected, however, and in case of a blowing apparatus being used, the ash pit door must be closed previously to introducing a blast of air. In case of an exhausting apparatus being employed, it must be placed on the top or any other convenient part of the chimney, and the ash pit be left open.

The water or other fluid is to be conveyed into the lower part of the descending cylinder *b*, through the pipe *k*, and the steam passes to the engine, through the pipe *l*. The boiler must also be provided with a safety valve, guage, cocks, &c. in the usual manner.

Fig. 2, represents a spherical steam boiler *a*, having a descending cylinder *b*, affixed to its bottom; and fig. 3, is a section of the same, shewing also the brickwork.

This steam boiler has its fire place *d*, inclosed within it, and a central tube *m*, open below, affords air to supply the fire. The heated air and flame from the fire are conveyed through a curved metal flue *n*, into a helical or spirally winding descending pipe or flue *o*, *o*, which distributes the heat throughout the water introduced into the lower part of the descending cylinder as before described. The spiral flue *o*, *o*, finally passing into the chimey *f*, through the pipe *p*.

The draught or current which compels the heated air and flame to descend the spiral pipe *o*, *o*, is caused by an exhausting apparatus, affixed to the top or other convenient part of the chimney *f*; but in case of a blowing

apparatus being used, then the bottom of the air tube *m*, must be closed, and a pipe to introduce the blast be provided, by which shall be admitted just beneath the bars of the furnace or fire place. This steam boiler must likewise be provided with a safety valve, gauge cocks, &c. in the usual manner. Fig. 4, is a front view of a steam boiler *a*, having three descending cylinders *b*, *b*, *b*, affixed to it. There are three fire places in this boiler, and also two diaphragms or partitions, one of which is shewn in section at *q*, and each of them has an aperture *r*, in it. These partitions are introduced in case the boiler should be used for a steam boat, for the purpose of preventing the water in the boiler from rushing towards one end of it when the vessel heels, and the apertures *r*, also serve to equalize the steam.

The water is to be introduced into this boiler at the aperture *k*, and is partially distributed into the two other descending cylinders through the branch pipes *s*, *s*, by which its level is maintained.

This boiler, of course, is likewise provided with a safety valve, gauge cocks, &c., and the heated air and flame from the three fires in it are to be compelled to descend through the spiral tubes *o*, *o*, by an artificial draught or current, produced in any of the various methods herein before named.

The Patentee concludes by saying, having thus shewn and described several methods of carrying my said invention into effect, I hereby declare that I do not mean or intend to limit myself to the employment of those methods only, but to avail myself of every other mode by which my improvements in evaporating fluids can be carried into effect, and particularly their application to the purposes of distillation and rectification, and to evaporating fluids in open vessels.—[*Inrolled in the Inrolment Office, May*, 1831.]

To Edward Cowper, *of Clapham Road Place, in the Parish of St. Mary, Lambeth, in the county of Surry, gentleman, for certain improvements in cutting paper.*—[Sealed 26th March, 1828.]

These improvements are the adaptation or combinations of certain known mechanical contrivances, which are put together in the form of a machine, designed to cut up into sheets the extended webs of paper made in a paper making machine on Fourdrinier's principle.

The entire length or web of paper made in a Fourdrinier's machine, is wound upon a reel placed on standards, from which reel the web of paper is to be drawn by the improved mechanism which forms the subject of this patent, and is to be, in its progress through the machine, cut both longitudinally and transversely into sheets of any required dimensions, which may be regulated by adjustments provided for that purpose.

Plate II. fig. 13, represents a side elevation of the machine; *a*, is the reel on which the web of paper of very considerable length has been previously wound, while making in a Fourdrinier's machine: this webb of paper being of sufficient width to produce two, three or more sheets when cut.

The several operative parts of the machine are mounted upon standards or frame work, of any convenient form or dimensions, and consists of travelling endless tapes to conduct the paper over and under a series of guide rollers; circular rotary cutters for the purpose of separating the web of paper into strips equal to the widths of the intended sheets; and a saw edged knife, which is made to slide horizontally for the purpose of separating the strips into such portions or lengths as shall bring them to the dimensions of sheets of paper.

The end of the web of paper from the reel *a*, is first conducted up the enclined plane *b*, by hand; it is then taken hold of by endless tapes extended upon rollers, not shown in the figure, as they are well known. These endless tapes carry the web of paper to the roller *c*, which is pressed against the roller *d*, by the weighted levers that its axle is mounted in. The roller *d*, may be either of wood or metal, having several grooves formed round its periphery, for the purpose of receiving the edges of the circular cutters *e*, mounted upon an axle turning in bearings upon the standards or frame.

In order to allow the web of paper to proceed smoothly between the rollers *c*, *d*, a narrow rib of leather is placed round the edges of one or both of these rollers, for the purpose of leaving a free space between them, through which the paper may pass without wrinkling.

From the roller *c*, the endless tapes conduct the paper over the roller *d*, and under the pressing roller *f*, and in this progress the edges of the circular knives *e*, revolving in the grooves of the roller *d*, cut the web of paper longitudinally into strips of such widths as may be required, according to the number and distance of the circular cutters apart.

The strips of paper proceed onward from between the rollers *d*, and *f*, conducted by tapes until they reach the roller *g*, when they are allowed to descend, and to pass through the apparatus designed to cut them transversely, that is into sheets.

This apparatus for cutting the strips into sheets is a sliding knife, placed horizontally upon a frame at *h*, which frame with the knife is moved to and fro by a jointed rod *i*, connected to a crank on the axle of the pulley *k*.

A flat board or plate *l*, is fixed to the standard frame

in an upright position, crossing the entire width of the machine, and this board or plate has a groove or opening cut along it opposite to the edge of the knife. The paper descending from the roller *g*, passes against the face of this board, and as the carriage with the knife advances, two small blocks mounted upon rods with springs *m*, *m*, come against the paper, and hold it tight to the board or plate *l*, while the edge of the knife is protruded forward into the groove of the board or plate *l*, and its sharp saw shaped teeth passing through the paper, cut one row of sheets from the descending strips, which on the withdrawing of the blocks fall down and are collected on the heap below.

The power for actuating this machine is applied to the reverse end of the axle, on which the pulley *k*, is fixed and a band *n*, *n*, *n*, *n*, passing from this pulley over tension wheels *o*, and *p*, drives the wheel *q*, fixed to the axle of the roller *d*, hence the roller *d*, receives the rotary motion which causes it to conduct forward the web of paper, and the other rollers *c*, and *f*, are actuated by their contact.

The rotation of the crank on the axle of *k*, through the intervention of the rod *i*, moves the carriage *h*, with the knife to and fro at certain periods, and when the spring blocks *m*, come against the plate *l*, slide their guide rods into them, while the knife advances to sever the sheets of paper. But as sheets of different dimensions are occasionally required, the lengths of the slips delivered between each return of the knife are to be regulated by enlarging or diminishing the diameter of the pulley *k*, which will of course retard or facilitate the rotation of the conducting rollers *c*, *d*, and *f*, and cause a greater or less length of the paper to descend between each movement of the knife carriage.

The groove of this pulley *k*, is constructed by wedge formed blocks, passed through its sides and meeting each other in opposite directions, so that on drawing out the wedges a short distance, the diameter of the pulley becomes diminished, or by pushing the wedges farther in, the diameter is increased; and the tension wheel *p*, being suspended in a weighted frame, keeps the band always tight.

As it is necessary that the paper should not continue descending while it is held by the blocks *m*, *m*, to be cut, and yet that it should be led on progressively over the roller *d*, the roller *g*, which hangs in a lever *j*, is made to rise at that time, so as to take up the length of paper delivered, and to descend again when the knife is withdrawn. This is effected by a rod *r*, connected to the crank on the shaft of *k*, and also to the under part of the lever *j*, which lever hanging loosely upon the axle of *d*, as its fulcrumn, and vibrates with the roller *g*, so as to effect the object in the way described.

The Patentee states that the several individual parts of this machine are not new, and that some of them are to be found included in the specifications of other persons, such as the circular cutters *e*, which are employed by Mr. Dickinson, and the horizontal cutter *h*, by Mr. Hansard; he therefore claims only the general arrangement of the parts in the form of a machine for the purpose of cutting paper as the subject of his invention, and present Patent right.—[*Inrolled in the Inrolment Office, September*, 1828.]

To Samuel Roberts, *of Park Grange, near Sheffield, in the county of York, silver plater, for his having invented certain improvements in plating or coating of copper, or brass, or mixtures of the same, with other metals or materials, with two metals or substances upon each other; as also a method of making such kind of articles or utensils with the said metal when so plated, as have hitherto been made either entirely of silver, or of copper, or of brass, or of a mixture of copper and brass, or coated with silver solely.*—[Sealed 26th July, 1830.]

In order to prevent the unpleasant appearance of plated goods, when the silver is partially worn off, the Patentee proposes to plate the copper or brass in the first instance, with the alloy commonly called German silver, and then upon this to plate the silver as heretofore; or the two may be put on together. The same process may be employed in the plating of wire.

It is presumed that the reader is already acquainted with the ordinary process of plating, as the Patentee has not thought it necessary to describe it, but simply furnished us with the above.—[*Inrolled in the Inrolment Office, September,* 1830.]

To Joseph Charlesworth, and Joshua Charlesworth, *of Holinfirth, woollen manufacturers and merchants, and* Samuel Mellor, *of the same place, cloth dresser, all in the county of York, for their having invented certain improvements on or additions to gig mills, for the raising and finishing of woollen cloths and other fabrics.*—[Sealed 18th December, 1828.]

The improvements proposed under this patent are designed to render the ordinary gig mill more effective

than heretofore, in drawing out the ends of the wool from the cloth, to produce the pile or nap upon its face, and the mode of effecting this is by pressing an elastic substance against the back of the cloth, at that part where the teasles of the gig barrel are acting upon its face.

Plate III. fig. 5, is a side elevation of a gig mill of the usual construction, according to the Yorkshire plan; *a, a, a,* is the end frame of the gig, commonly constructed of cast iron; *b, b,* is the gig barrel, the axle of which turns in plummer blocks bearing upon the end frames. The periphery of the gig barrel is covered with teasles or brushes of bristles or wires, which are intended to act upon the face of the cloth as it passes for the purpose of drawing out the ends of the wool, that is raising the pile; *c, c, c,* is the cloth conducted by rollers *d,* and *e, e, e,* as usual, and *f,* is an adjustable roller, which by being slidden out, partially withdraws the face of the cloth from the gig barrel, and thereby diminishes the operation of the gig upon the cloth when required.

The barrel of the gig is driven through the agency of gear connected to a steam engine, water wheel, or other first mover, by rotary power applied to its axle, which turns with considerable rapidity in the direction of the arrows; the cloth travels in the reverse direction, as shewn by its arrows, being drawn through by the roller *d,* which also receives its rotary motion by gear from the first mover. A cylindrical brush *g,* is placed in front of the gig barrel, its hairs pressing with a soft elastic force against the back of the cloth, by which pressure the teasles, or wire cards, or brushes are made to take more effective hold of the ends of the wool than they are enabled to do in the ordinary construction of gig mills.

The Patentees say that they do not intend to confine themselves to the cylindrical brush, as a cushion or

various other elastic substances, if pressed against the back of the cloth at the part when its face is brought in contact with the gig barrel, might answer the purpose nearly as well, and they claim as their invention the application of an elastic substance at the back of the cloth when operated upon in a gig mill as above described.—[*Inrolled in the Inrolment Office, February*, 1829.]

To JOHN FERRABEE, *of the Thrupp Mill and Foundry, in the parish of Stroud, in the county of Gloucester, engineer, for his having invented improvements in machinery, for preparing the pile or face of woollen or other cloths requiring such process.*—[Sealed 23rd December, 1830.]

THE object of this invention is to draw out the ends of wool, that is to raise the pile on woollen cloth in diagonal directions across the cloth, instead of raising it lengthwise, as is the case in the ordinary gig mill.

In raising the pile on cloths it is desirable to draw out the ends of the wool in every direction, in order to cover the whole face of the cloth with nap as perfectly as possible, previously to its being submitted to the cropping or shearing operation. The ordinary gig mill will not effect this object completely, as it only draws out the wool in that direction that the cloth travels, and in consequence it is the practice of some clothiers, previous to shearing, to row or brush their cloths on the face with teasles or wire cards, by hand crosswise of the cloth, as well as submitting them to the operation of the gig mill.

The intention of the Patentee is to effect this by machinery, which he does by causing a series of teasle

brushes to traverse across the cloth, while the cloth passes onward through the machine, consequently the pile is raised in diagonal directions instead of lengthwise.

Plate III. fig. 6, is a front view of this improved machine; *a*, is a roller or beam upon which the cloth is wound, as it is drawn off from a similar roller at the back of the machine, but in its progress it is passed over several rollers placed upon the same level as *b*, which act as a sort of bed to support it.

Rotary motion is given to the machine by a band passed over the rigger *c*, fixed upon the shaft *d*, and at the reverse end of this shaft there is a pulley *e*, from whence a band extends to the pulley *f*, upon the roller or beam *a*, which causes the entire length of cloth to be conducted progressively through the machine; when that is done, the cloth is carried back again for a second operation, by throwing the machinery out of gear, and applying the rotary power in the opposite direction.

Upon the shaft *d*, a toothed wheel *g*, is fixed, which takes into another toothed wheel *h*, on the end of the upper shaft; this shaft carries two bevel toothed wheels *i*, *i*, which drive similar wheels fixed to the transverse axles mounted in the frame work or standard at *k*, *k*. On each of these axles there is also fixed a drum wheel *l*, *l*, and on a transverse axle in the middle is also mounted two similar drum wheels *m*, turning loosely upon their axles; these drum wheels carry the endless bands *n*, and *o*, upon each of which is mounted a series of frames or handles containing teasles.

When rotary motion is given to the shaft *d*, the upper shaft with its bevel wheels *i*, *i*, is made to revolve, and also to drive the transverse axles with the drum wheels *l*, *l*, and hence the boards with the teasles traverse across

the machine, as shewn by the arrows causing the pile or nap of wool to be raised diagonally as the cloth proceeds.—[*Inrolled in the Inrolment Office, June,* 1831.]

To JOHN M'INNES, *of Auchenreoch, and of Woodham, in that part of the United Kingdom of Great Britain and Ireland called Scotland, Esq. for his having invented the manufacture or preparation of certain substances which he denominates the "British Tapioca," and the cakes and flour to be made from the same.* [Sealed 24th April, 1830.]

THE Patentee describes in this specification, his mode of preparing potatoes, turnips, beetroot, or any other tuberous roots, for the purpose of converting them into a farinaceous substance to imitate Indian Tapioca. The potatoes or other roots, are to be washed clean from all external matter, and then grated or pounded into a pappy state, after which the pulp is to be washed in pure water, and dried by evaporation.

After the farina has become perfectly dry, it is to be passed through a fine sieve into an iron pan, placed over a fire. In this pan it is slightly baked, but must be stirred about during the operation, to prevent its becoming burned; and when it feels crisp or gritty between the fingers, it may be considered done enough.

If it is desired to make up the farina into cakes, wooden moulds must be provided and placed in the iron pan, when a sufficient quantity being pressed into each mould, it adheres together and becomes what the Patentee denominates "*British Tapioca*."—[*Inrolled in the Inrolment Office, October* 1830.]

To RICHARD PROSSER, *of Birmingham, in the county of Warwick, civil engineer, for his invention of certain improvements in manufacturing nails or tacks, for ornamenting boxes, and articles of furniture.*—[Sealed 13th July, 1831.]

THESE improvements in manufacturing nails or tacks for ornamenting boxes and articles furniture, consist in constructing or making the said nails or tacks by combining or uniting several pieces of metal, without employing solder, or other fusible compound; which improvements are effected in the following manner:—

The shank or stem of the nail or tack, which is intended to penetrate or enter the wood or other substance to which the nail or tack is to be affixed, is made or formed separately from the head or upper surface of the nail or tack; and that part of the nail or tack which constitutes the back or under part of the head of the nail or tack, is also formed separately and distinct from the head or the shank. These several parts, when properly made, are put together; and by pressure united, so as to form a complete nail or tack, as shewn in Plate III, at figs. 7 and 8; all the other figures which follow, represent the separate parts of the nail or tack, in different positions.

In forming the shank or stem *a*, of the nail or tack, shewn at fig. 9, iron is to be employed, or any other metal which may be sufficiently stiff to allow of the operation of driving. This shank may be made from wire cut off, pointed, and the knobbed part at top formed in a machine; or it may be made from metal by the hand, as may be found most desirable.

The head or upper surfaces *b*, *b*, of the tack or nail, is formed out of rolled sheet metal of any description, applicable to the purpose, by first cutting out a disc of suitable diameter, and then pressing that disc first, into

the cup form, shewn edgewise at fig. 10, and the same in section, at fig. 11; and as seen on the concave or under side, at fig. 12, and then by further pressure it is intended to bend inwards, that is towards the concave the edges of the said cup, as shewn by the representation of the under side at fig. 13, and edgewise at fig. 14.

In preparing that portion of the nail or tack, which is to constitute the back or under part of the head *c*, it is proposed in like manner to cut a disc of suitable diameter out of thin sheet tinned iron, or other metal, and press it into the dish shape, shewn at fig. 15; that is to form the disc concave near its periphery and convex, or rising in the middle with a hole through the centre, as shewn.

It is not intended to claim any particular apparatus for or method of forming the said discs into a cup and a dish as described, but to employ any of the apparatus or means at present in use for effecting such forms from sheet metal. When the stem or shank *a*, the head or face *b*, and the back or under part *c*, are prepared in the way described, they are then to be confined by first introducing the shaft or stem *a*, into the central hole of the disc *c*, which it is prevented from passing through by the knob or enlargement at its upper end, and then placing the head *b*, over the boss or knob of the shank, and over the dish as shewn in the sectional figure 16, when by means of a suitable press with a matrix and punch; force is applied against the under surface of the dish *c*, and the upper surface of the head *b*, by which pressure the parts are brought into close contact, as shewn at fig. 16, and the edge of the cup *b*, upon the dish *c*, so as to cause it to embrace the edge of the dish, and thereby to fix the three parts firmly and securely together, which constitutes the improvement in the manufacture of nails or tacks proposed by the Patentee.

The construction of nails or tacks above described, may be varied when the top end or knob of the shank or stem, can be conveniently spread out as large as the head of the nail or tack, for in that case the dish or part *c*, at the back or under part of the head may be despensed with, by bending in or turning under the edge of the face or top piece *b*, as above described, and causing it to embrace the enlarged knob or head of the shank.

The Patentee in conclusion observes, that the separate parts, which when confined in the manner above described, constitute his improvements in manufacturing nails or tacks for ornamenting boxes and articles of furniture, may be made of various sizes, according to the intended size of the nail or tack, and they may be prepared by any of the known ordinary means at present in use for cutting and pressing metal, none of which form any part of his invention; but he claims as his invention, the combination of parts in the manner described to constitute a nail or tack for ornamenting boxes and articles of furniture, and which he believes to be entirely new and never before to have been practised by any other person whomsoever.—[*Inrolled in the Roll's Chapel Office, September*, 1831.]

Specification drawn by Mr. Newton.

To Benjamin Goulson, *of Pendleton, near Manchester, in the county of Lancaster, surgeon, for his having invented or found out certain improvements in the manufacturing of farina and sugar, from vegetable productions.*—[Sealed 14th December, 1829.]

The Patentee proposes to prepare from carrots, turnips, beetroot, mangelwurzle, or potatoes, or any other roots of that kind which may be conveniently obtained, a fine white and nutritious farinaceous substance, capable of

being converted to the best white bread, and to all the purposes of fine wheaten flour; and also into sugar.

The roots are to be washed perfectly clean, or deprived of their skins, and are to be cut into thin slices. and then submitted to the action of a solution of acid in water; sulphuric acid is to be preferred, but any of the other acids will answer the purpose. The quantity of acid to be employed will depend upon the roots to be acted upon: from two to ten pounds of acid will be required for every hundred weight of roots; carrots will require the smallest quantity of acid, potatoes the greatest.

This steeping of the roots in the solution of acid, will perfectly change their characters and taste, and when they have been sufficiently acted upon, the acid and other matters held in solution, are to be removed from the slices of the roots, by washing them repeatedly with pure water. They may be afterwards dried by exposure to the air and sun, or by a kiln at a low temperature; and when the mixture has been evaporated, and the slices of the roots brought to perfect dryness, they may be submitted to the operation of a mill, and ground into farina or white flour in the ordinary way.

The slices of roots thus prepared will retain their nutritious properties unimpared for any length of time, and in any climate, if not exposed to damp; and the flour obtained from grinding them will have exactly the same properties, appearance, and flavour, as wheaten flour.

In preparing sugar from the said roots, they are to be washed and sliced, and submitted to the action of the acid in the way above described, and then reduced into farina, as a first part of the process. The farina is then to be boiled with a solution of acid, in the proportion of about two pounds of the acid to one hundred weight of the farina. A saccharine matter is produced by this

operation, which my be crystallized or granulated into sugar, by the ordinary mode of evaporating cane juice, or other vegetable extracts from which sugar is commonly made.

Instead of reducing the roots to a farinaceous powder, as last described, for the production of sugar, they may be steeped in their raw state in a solution of acid, in the proportion of ten pounds of acid to every hundred weight of roots; and after having been acted upon by the acid for about three days, the saccharine matter will be produced, which may be treated as before described, and sugar obtained therefrom.—[*Inrolled in the Inrolment Office, June,* 1831.]

Original Communications.

Art. I.—On Toothed Wheels.

To the Editor of the London Journal of Arts and Sciences.

Sir,—I have latterly been engaged in putting up some wheel geering that required great accuracy, so as to enable them to run as smooth as possible; and I consider that I have succeeded in so doing; the plan adopted, I believe possesses some originality, and I therefore send it to you for publication, if worth your notice. This ground is so well treated by various authorities I have read, that little is to be expected of novelty. I have tried various curves for the teeth of wheels, but find none to answer so well as the epicycloid. The Technical Repository, published 1822, (Vol. I.) contains some very valuable information on this subject.

In the wheels made for me on a late occasion, there was no allowance for clearance. The cogs and spaces being equal, except at the tops and bottoms of the teeth, and only so much that light was barely visible; in a very few revolutions the wheels run as smooth almost as belt or band.

To obtain truth, and with but little trouble of calculating for odd members required, I availed myself of the following geometrical construction, for finding the circumference of a circle from its diameter, and which will be found to contain no error beyond 00000,1, of the latter to the former, and that I consider never could be discovered in workmanship of the most exquisite finish.

Take the diameter of any wheel or circle with compasses and step it from A, to B, and to D, (see the diagram in Plate III, at figure 17), on a horizontal or base line, upon which raise a perpendicular, and again step upon it the same distance from A, to M, N, K; again scribe, and intersect the arcs made from B, D, meeting in E; from E, and D, do the same, with the same distance, meeting in cross arcs at F; upon D, raise a line parallel to A, K, intersecting the line B, F, in C, and upon this describe the circle G, H, O, P,—C, K, will be the circumference of a circle, of which G, C, is the diameter: the error being something less than one hundred-thousandth part of the distance G, C. It follows therefore, that if C, be the centre or joint of a sector, a proportional compass or callipers, the opening of either will express or point out the circumference and diameter of whatever circle or wheel may be required at one and the same time.

If it be required to have an odd number of teeth in a wheel, say 67, one inch pitch, for tooth and space, lay off a straight line equal to $67 \times 2 = 134$ divisions, stretch the sector to this line K, L, and it will be the diameter—O, P,

of the proportional compasses or callipers, will be the same of course.

If it be required to cut a wheel from a solid blank circle of metal, to have, say 43 teeth of $\frac{1}{2}$ inch pitch, and that the proportion of teeth be also given as to the thickness and height, each shall have, viz. 4-5ths or 3-4ths of its height to be the thickness, reduce either proportions to a decimal, and divide this decimal into 3,1416,—the quotient resulting therefrom will be the number of spaces to be added to the line K, L, for the tops of teeth, or deducted therefrom for the circle that bounds the bottoms of the teeth; polygons of prime numbers may readily be found out by this means.

You will observe the compass to be used with this geometrical problem is never to be altered from first to last in forming its construction.

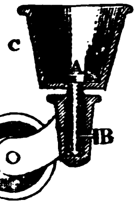
I think if this subject had the attention of some of the mathematical instrument makers directed to it, something practically useful to wheel makers might result.

I remain, yours very truly,

JOHN OLDHAM.

Bank of Ireland, Dublin.

P. S.—I know not whether you may consider there is any material novelty in the construction of the castor



described here by sketch. I had several sizes made for myself and others, for sofas, beds, and tables, which have performed much better than any I have yet seen. The spindle A, is a fixture in the boot socket C, and rests upon its point in spindle socket B. The friction by this arrangement is considerably reduced.

From all I have seen in this way I do consider it new, and well calculated for its purpose, and is not subject to injnre carpets so much as ordinary castors.

LITERARY AND SCIENTIFIC MISCELLANEA.

Society of Fine Arts.—A Society has been formed at Prague, under the auspices of the Emperor of Austria,. Its object is, "to purchase the most successful productions of living native artists, and by this means to incite those artists to activity, and to promote a more extended taste for the fine arts, among the public at large." The mode for effecting this excellent purpose is simple enough. The Society consists of an unlimited number of members, whose only qualification is the contribution of a yearly subscription of eight shillings. With the fund thus raised, the committee appointed by the members is to purchase as far as their resources will permit, a selection of the works exhibited annually at the Royal Academy; preference being given to the efforts of indigent and unpatronized merit.

We see no reason why such an institution should not prosper in our own country. It would do honour to the generous feelings and expanding taste of our fellow countrymen.

Ancient Coins.—A Spanish peasant in the environs of Luga, in Gallicia, tilling his field, lately found two earthen jars, containing several pounds weight of gold coin, of the Emperors Nero, Vespasian, Adrian, and Trajan; though centuries have concealed them in the earth, they are as fresh and perfect as if they had just been issued from the mint. Each coin weighs about two drachms and a half, and the gold is of the finest quality.—Madrid, August 20.

Imperial Encouragement of Science.—The Emperor of Russia has presented to Mr. Harvey, F. R. S. L. and E. A magnificent diamond ring, as a mark of his approbation of that gentleman's researches in ship building. It is rather rare to record such tributes of regard, where science is concerned, from foreign monarchs bestowed on English talent.

Dr. Ure, of Glasgow, has invented some important improvements connected with distillation, and evaporation, connected with which is a curious thermometrical valve, that admits or excludes a cold fluid, according to the increasing or diminishing light, of temperature in the apparatus or apartment with which the conducting tube communicates. These inventions have been made the subjects of patents, both in Scotland and England, and will very shortly be laid before our readers.

NOTICES OF NEW BOOKS, &c.

No. XXIII. of Murray's Family Library, has just appeared, containing " A Family Tour through South Holland, up the Rhine, and across the Netherlands to Ostend. This work is a pleasing and interesting account of the tour; it contains many valuable remarks on the country, history, customs, &c. of the Dutch. The account of the visit to the important city of Antwerp will be welcome to the general reader, as the political situation of that city at this time attracts so much public attention. The Tourist remarks—

" In proceeding up the Scheldt, it is impossible not to be struck with the simple means by which the Dutch have succeeded in producing the same effect, though perhaps in a smaller degree, for which, in England, we launch out into the most extravagant expense. Nothing can exceed the economy practised in the construction of their flood-gates, and the wooden piers, in which their sluices are placed; a species of hydraulic apparatus, that with us are generally formed of the most costly workmanship in masonry. Having no stone in their country but that which must come from the banks of the Meuse or the Rhine, necessity has driven them to the use of other materials, and its place is efficiently supplied by the less costly, though certainly less durable substance, wood."

" The Topography and Antiquities of Rome, including the recent Discoveries made about the Forum and the Via Sacra. By the Reverend Richard Burgess." To the classical student

this is a valuable book—to the classical traveller an invaluable one.

Dr. Lardner's Cabinet Cyclopedia (Useful Arts), No. XXII., containing a Treatise on the Origin and present State of Silk Manufactures. Independently of the mechanical processes here mentioned, and minutely described, there is a great deal of curious information in this little volume; so that while the former must recommend it to every manufacturer and workman, the latter will secure it the approbation of the general reader.

Examples of Gothic Architecture. By A. Pugin.—To those who are acquainted with Mr. P.'s former works, the *Gothic Specimens*, it will be ample recommendation of the present one to say, that it forms a continuation of the same plan, and is executed with equal fidelity and taste, or rather exhibits a superior degree of research, and that more perfect acquaintance with the subject, arising from continued study and experience.

The Commercial Vade-Mecum. By Allen and Co. Glasgow.—A Lilliputian in dimensions, a giant in information. This little work has just been shown us; it is in truth well deserving of its Vade-Mecum title, for it possesses a fund of useful information to the man of business, and may be carried in the waistcoat pocket.

Messrs. Nicholson and Robottom have just issued a new Edition of their excellent volume on Algebra, which, among other improvements, contains a novel and very simple mode of extracting the square-root.

APPENDIX

To the Report of the Select Committee of the House of Commons, on Patents.

Papers delivered in by John Farcy, Esq.

[*British Law of Patents for Inventions.*]

(continued from p. 351.)

Koops ex parte in Chancery. A Petition to dispense with the enrolment of the Specification of Koops' Patent, 1801, for making Paper from Straw, &c.; that the specification might not be made

public until application could be made to Parliament to keep it concealed, and thus prevent foreigners getting the invention. Heard 22nd January 1802, before Lord Eldon, who dismissed the Petition, because the time allowed in a Patent which is sealed, cannot be extended by any authority except an Act of Parliament.

Lord Chancellor Eldon: " A clause for this purpose was inserted in an Act of Parliament last Sessions, but was universally rejected. If an invention is pirated, and an action is brought, the specification must be produced. The King's subjects have a right to see the specification, that they may not throw away their time and money, upon what the patentee might afterwards call an infringement of his patent, but which they would not have done, if they had seen the specification. I cannot enlarge the time allowed by the patent for specifying, if the patent is sealed, for it is void, if that proviso is not complied with. You should have applied to the Attorney General before, for a longer time to be allowed in the patent itself, upon the special circumstances. I cannot take the great seal from a patent, and repeal it, in the most essential point. You can do nothing, except by an Act of Parliament, to enlarge the time mentioned in the patent."—Vesey, jun. Chancery Reports, Vol. VI. p. 599.

In the case of the Universities of Oxford and Cambridge against Richardson, in Chancery, to restrain the printing of books contrary to the patent to the Universities and to the King's Printer. Heard in 1802.

The Lord Chancellor Eldon said, Can it be sustained, that the King's subjects in Ireland, have, notwithstanding the patent to the King's printer in Ireland, a right to introduce into that country, books printed by the King's printer in Scotland, under his patent? or *vice versa*?

If a patent for an invention is granted for England, it does not extend to Ireland, but a distinct patent may be granted for Ireland, under Great Seals, which are still kept distinct for that purpose amongst others; and time is allowed for the enrolment of one patent, on account of the purpose to get a patent elsewhere. The right under a patent for one country, is confined to that country, and would not allow the patentee to bring the article for sale into the other country, where a patent was in force for the same thing. If any of the King's subjects buy an article in Ireland, as a watch or a book, and bring it here, where there is a patent for it, I do not know whether it might not be sold as part of his effects, for that belongs to the necessities of the habits of life, but those articles cannot be brought here for the purpose of trading.—Vesey, jun. Chancery Reports, Vol. VI. p. 708

Tennant against———An action for infringement of Tennant's

Patent of 1798, for a Bleaching Liquor. Tried in the King's Bench, 23d December 1802, before Lord Ellenborough. The plaintiff was nonsuited.

The utility of the Bleaching Liquor was fully proved, and that it was not at all known or used, before the patent. A bleacher at Nottingham proved that he had used the method six years before the patent, but he kept it secret, except from his two partners and two servants. A chemist at Glasgow stated, that he had, in conversation with the patentee, two years before the patent, suggested to him to keep the lime water agitated during the process, which is an essential condition. *Lord Ellenborough:* "This is a scandalous patent, equally unfounded in law and justice; there are shameful abuses in patents, and some remedy is necessary."

Hesse against Stevenson. An action to recover back 1,800*l.* paid for shares of Koops' Patent of 1801, for making Paper from Straw, &c. which shares had been sold by the Assignee of the Patentee. Tried in the Common Pleas Michaelmas 1803, before Lord Alvanley. Judgment for the Plaintiff.

The patentee Koops had been a bankrupt, and had not obtained his certificate at the date of his patent, nevertheless he assigned that patent to Stevenson the defendant, who (under power of an Act 41 Geo. 3, extending the benefit of that patent to 60 persons) sold to plaintiff certain shares of the patent, and received £.1,800 for such sale. It was contended that the uncertificated bankrupt had no power to assign his patent, without consent of his creditors, and sales made under such invalid assignment being void, the money ought to be returned.

Mr. Justice Chambre: "As the patent right is made assignable, why may it not be assigned under a commission of bankrupt?" Lord Alvanley: "The schemes which a bankrupt may have in his own head, before he obtains his certificat, or the fruits which he may make of such schemes, do not pass to his assignees of bankruptcy, nor could they require him to assign them over, provided that he does not carry them into effect until after he has obtained his certificate; but if he avails himself of his skill, and thereby acquires a beneficial interest, that may be the subject of assignment; the interest in the patent is of such a nature:" viz. "it belongs to his creditors, and he could not assign such patent to any others." "The Act does not give any title to Koops, that he had not before it was passed; it only allows assignments to be made to any number of persons under sixty, instead of only five."—Davies, p. 244.

The King against Murray. A scire facias to repeal Murray's Patent of 1801, for constructing the Air Pump, and other parts of Steam Engines. Tried in the King's Bench before Lord Ellenborough, 9th July 1803. Verdict for the Crown; and the Patent was cancelled and repealed.

All those parts of the invention which were really new, and useful, and deserving of a patent, were proved to have been invented by Messrs. Boulton and Watt, and to have been practised at their manufactory, for a considerable time before the date of the patent.

Huddart against Grimshaw. An Action for infringement of Huddart's Patent, of 1793, for a new mode of making great Cables and other Cordage, so as to attain a greater degree of strength therein, by a more equal distribution of the strain upon the yarns. Tried in the King's Bench, before Lord Ellenborough, 23rd December, 1803. Verdict for the Patentee.

The invention was to make cordage with all the yarns disposed in concentric cylindrical layers, one over another; for this purpose the yarns are wound each upon a distinct bobbin, and therefrom the yarns are conducted through holes in a register plate, those holes being arranged in concentric circles around a central hole; the yarns are all brought together through a tube into one strand, after passing through the holes. That strand being turned round, and at the same time drawn forwards, draws all the yarns at once, with a screwing motion, through the tube and through the holes in the register plate, unwinding them from the several bobbins, and collecting them into one twisted strand, which is compressed into a compact cylindrical form in drawing through the tube, and in which each yarn occupies its own place, always remaining at the same distance from the centre of the strand. Each bobbin being at liberty, will allow as much yarn to unwind from it as is wanted, according to the place that yarn occupies in the strand, whether the outside, or the middle part of the cylinder.

The infringement was not proved by direct evidence; it was proved that the defendant had visited the patentee's manufactory, and seen his invention in 1799, and afterwards requested to be allowed to use the patent without premium, but that was refused, also that soon afterwards defendant ceased to make the strands of his ropes in a long rope walk, in the common way, but made them within a small space, keeping the process very secret; the ropes he sold, were, on examination and dissection, found to have the same texture as Huddart's patent ropes, all the yarns being disposed in the strand in concentric layers, so as to distribute an equal tension, and portion of the strain, upon every yarn, which is not the case in common ropes.

Lord Ellenborough: "When it is found to agree in all its qualities with a rope actually made on Huddart's plan, it is primâ facie evidence, till the contrary is shown, that it was made upon his method," and that defendant has made use of a part of the plaintiff's invention. The importance of that invention is proved

beyond a doubt; but it is questioned whether it be a new invention, and whether the patent embraces, as essential parts, any thing which was a prior invention communicated to the public before by Mr. Belfour, who had a patent in 1793.

"In inventions of mechanism, there are some materials which are common, and cannot be appropriated by any patent; they are common elementary materials to work within machinery; but it is the adoption of those materials to the execution of any particular purpose, that constitutes the invention; and if the application of them be new, if the combination in its nature be essentially new; if it be productive of a new end, and beneficial to the public, it is that species of invention which may be protected by patent; but if, prior to the date of the patent, any part of that which is the substance of the invention, has been communicated to the public in the specification of any other patent, or is part of the service of the country, so as to be a known thing, the patent cannot be maintained.

"It is required that the specification shall convey to the public a corresponding advantage with that of the patentee; so that, any person who is skilled in the subject, looking at a specification, may be able to accomplish the end. If, in stating the means necessary to the production of the end, he oversteps the right, and appropriates more than is his own, the patent cannot be maintained. Any particular thing before in use, which he has applied in a new manner, so as to effect a new purpose, may be part of the new invention; but if he states that which of itself is not new, but old and known to the world, though it was unnecessary for him to do so, he has overstepped his right, and has included in his invention that which is not his invention, wherefore his patent would be void." Davies, p. 265.

Smith against Dickenson. An Action for Damages for taking an undue advantage of the confidential communication of a secret Invention, and surreptitiously obtaining a Patent for the same, viz. Dickenson's Patent 1802, for a method of fixing Girth-straps to Saddles. Tried 6 December 1803 in the Common Pleas, before Lord Alvanley. Verdict for Plaintiff.

Thomas Smith invented a spring strap for a saddle, to give elasticity and play to the girths, and allow the horse to breathe freely; he intended to take a patent for it. Dickenson having had a patent in 1801 for a similar object, requested to know Smith's secret, and made a written engagement not to take any advantage of the communication, under a penalty of 1,000*l.* whereupon Smith showed Dickenson the plan. They afterwards agree to share the profits of the invention, and take out a patent in Smith's name. Nevertheless Dickenson took out the patent in his own name, and without Smith's knowledge or consent; but being unable to give

full instructions for specifying the invention, he was obliged to ask Smith's assistance, and on Dickenson's renewal before Mr. Nicholson, (who was employed to draw the specification) of the promise, that the patent, though in Dickenson's name, should be for their joint benefit, Smith gave the requisite instructions for the specification, and it was enrolled by Dickenson.

After all, Dickenson used the patent for his own benefit, he denied by letter that it contained any thing beyond his own invention, and refused to execute any articles of partnership. Verdict for plaintiff with 300*l.* damages and 40*s.* costs; defendant, at his own cost, to assign the patent to plaintiff, whose communication the jury found to be the same invention as that specified; also that plaintiff, by giving instructions to prepare that specification, had in effect agreed to the patent being in Dickenson's name; also liberty given to plaintiff to move the Court, for a verdict for 1,000*l.* if the Court are of opinion that the sum mentioned in the defendant's engagement was liquidated damages, and not a penalty. And liberty to defendant to move for a nonsuit, if the Court are of opinion that undue advantage had not been taken of plaintiff. —Davies, p. 329.

10th February, 1804. The Court of Common Pleas was moved for a nonsuit on one side, and for an increase of the verdict on the other side. The Court were clearly of opinion, "that the word penalty, in the engagement made by the defendant, prevented the 1,000l. being considered as liquidated damages."

Lord Alvanley: "After the defendant had engaged to take no advantage of the communication, he entered a caveat to prevent any other person but himself from taking the patent; that of itself was an improper use of the discovery, upon which plaintiff might have brought an action, though it is uncertain what damages he could have recovered. Defendant having fraudulently obtained the patent, but being unable to specify, he tempted plaintiff by offers of advantage, to specify; and, though he agreed to do so, yet it was by a continuation of the same fraud by defendant; for as those offers were never fulfilled, the plaintiff may resort to the breach of the first agreement, of which defendant is proved guilty; he has since denied and repudiated any subsequent agreement, which was a conditional one, and the conditions have not been performed; hence the action may be maintained on the original agreement."

Mr. Justice Heath: "The action is on a subsisting agreement, which defendant broke by entering a caveat, and taking a patent in his own name. It appears to me that the first agreement was not waved by the treaty for the second argreement, which plaintiff was induced to enter into by fraud of defendant, and by promises which have been broken."

Mr. Justice Rooke: "There can be no doubt that the first agreement was broken, by defendant's entering the caveat and taking the patent in his own name, immediately after the disclosure of the invention. Before the defendant can have the plaintiff nonsuited on the ground of the second agreement, he must prove that agreement, whereas he disavows all such agreement, and insists upon his right to the invention." Verdict confirmed.—Bosanquet and Puller's Reports, Vol. III. p. 630.

Hare against Harford and Taylor. An action to enforce payment of an Annuity granted to Hare, by Harford and Co. in consideration of his licensing them to carry on their Brewery according to Hare's Patent of 1791, for a Close Cover and Water Cistern over the brewing copper, to retain the essential oil of hops in boiling worts for beer, the water for the next brewing being heated in the cistern, by the steam. Tried 14th July, 1803, in the Common Pleas, before Lord Alvanley. Verdict for the Defendant.

On the ground that the invention was similar in principle to that for which a previous patent had been granted to T. S. Wood in 1784. Hare's apparatus is now universally employed in all extensive breweries; the construction is more complete than Wood's.

Taylor against Hare. An Action to recover back £.425 paid to Hare by Plaintiff, for license under Hare's Patent of 1791, in part discharge of a bond, dated 1792; the continuance of which bond had been before determined, by the Patent being found bad. Tried in the Common Pleas, and a verdict for Plaintiff for £.425, subject to the opinion of the Court, which was a judgment for Nonsuit, thus given 20th May, 1805.

Sir James Mansfield, Chief Justice: "No action like the present has ever been known. Two persons, equally innocent, made a bargain about the use of a patent right, both supposing it to be valuable. The present plaintiff agreed to pay the patentee for the use of the invention; he has had the use, and, for any thing that appears, he may have made considerable profit. The two may be considered in some measure as partners in the invention, which the plaintiff would never have thought of using, had not the privilege been transferred to him by the patentee; how then can we say that the money paid, ought to be returned?"

Mr. Justice Heath: "A plaintiff having received benefit from a thing which has afterwards been recovered from him, cannot maintain an action for the consideration originally paid. We cannot take an account here of profits. If a man lease land, and the lessee pay rent, and is afterwards evicted, shall he recover back the rent, though he has taken the fruits of the land?"

Mr. Justice Rooke was of the same opinion.

Mr. Justice Chambre: "The plaintiff has had the enjoyment of what he stipulated for; both parties have been mistaken; the defendant has thrown away his money in obtaining a patent for his own invention; not so the plaintiff, he has had the use of another person's invention for his money. In Arkwright's case no money was paid back." Judgment of Nonsuit.

This case was cited by Mr. Justice Bayley, in a trial on shipping, Mortimer *v.* Heeming, in the King's Bench, 16th May, 1825. "*A.* obtained a patent for an invention, of which he supposed himself to be the inventor, and agreed to let *B.* use it, upon payment of a certain annual sum secured by bond; this sum was paid for some years, until *B.* discovering that *A.* was not the first inventor, but that it had been in public use before *A.* obtained his patent, brought an action for the money had and received, to recover back the amount paid; it was held that he could not recover."

"Harmer against Playne, in Chancery. An application to dissolve an injunction which had been previously issued, torestrain Defendant from violating Harmer's Patent of 1794, for a machine for shearing or cropping Woollen Cloth. Heard 30th June 1807. The injunction continued.

Mr. Harmer had a patent in 1787 for a machine for cropping or shearing woollen cloth. The invention came into use, and in 1794 he took another patent for improvements on his former machine. In the specification to the second patent, he described the whole machine in its improved state, without in any way distinguishing what the improvements were, or making any mention of the former patent. It was objected that this was not a good specification, as it led people to believe that they were forbidden to use every thing described in it, during the whole term of the second patent, when in fact they had a right to use the greatest part, at the expiration of the first patent. On the part of the patentee it was answered, that the patent and specification must be construed together, as one instrument, and that as the patent recited the title and date of the former patent, persons would be led to examine the former specification, which was duly enrolled, and could thereby see what they were at liberty to use, after the expiration of the first patent.

New Patents Sealed, 1831.

To Jacob Perkins, of Fleet Street, in the city of London, engineer, for his having invented certain improvements on his former Patent, dated the 2nd day of July, 1831,

making the same applicable to the evaporating and boiling of fluids for certain purposes.—Sealed 27th August—6 months, for inrolment of specification.

To Benjamin Aingworth, of the parish of Birmingham, in the county of Warwick, button maker, for his invention of an improvement in the making and constructing of buttons.—30th August—6 months.

To Jean Jaques Jelquier of Castle Street, Leicester Square, in the county of Middlesex, merchant, in consequence of a communication made to him by a certain foreigner residing abroad, he is in possession of certain improvements in the machinery for making paper, which he denominates "Xeranothlipte."—31st of August—6 months.

To Harrison Gray Dyar, of Panton Square, in the county of Middlesex, Gentleman, for his invention of an improvement in tunnelling, or method of executing subterraneous excavations.—5th September—6 months.

To George Forrester, of Vauxhall Foundry, Liverpool, in the county of Lancaster, civil engineer, for his invention of certain improvements in wheels for carriages and machinery, which improvements are applicable to other purposes.—5th September—6 months.

To William Bickford, of Tuckingmill in the county of Cornwall, leather seller, for his invention of an instrument for igniting gunpowder, when used in the operation of blasting rocks, and in mining.—6th September—6 months.

To James Neville, of Great Dover Road, in the county of Surrey, engineer, for his having invented an improved apparatus for clarifying water and fluids.—9th September—6 months.

To George Holworthy Palmer, of Manchester Street, Gray's Inn Road, civil engineer, for his invention of

certain improvements in the steam engine and boiler; and apparatus, or machinery connected therewith, applicable to propelling vessels, carriages, and other purposes.—16th September—6 months.

To John Potts, Richard Oliver, and William Wainwright Potts, all of New Mills, in the county of Derby, engravers to calico printers, and co-partners, for their having invented an improved method or process of obtaining impressions from engravings in various colours, and applying the same to earthenware porcelain china, glass, and other similar substances.—17th September—6 months.

To Sampson Mordan, of Castle Street, East Finsbury, in the county of Middlesex, engineer, and Willian Brockedon of Devonshire Street, Queen Square, of the same county, Esqs. for their having invented certain improvements in the construction of writing pens and penholders, and in the method of using them.—20th September—2 months.

To Mark Cosnahau, of the Isle of Man, Esq. for his having invented certain improvements in apparatus, modes, or process for converting sea or salt water, and also other brackish turbid or impure waters, into purified or fresh water, which apparatus, modes, or processes or parts thereof may be applied to other purposes.—20th September—6 months.

CELESTIAL PHENOMENA, for October, 1831.

D.	H.	M.	S.	
1	0	0	0	⊙ before the Clock 10 min. 9 sec.
2	0	0	0	☾ in conj. with α in Leo
2	11	0	0	☾ in conj. with ρ in Leo
2	22	0	0	☾ in conj. with ♄ lon. 10, in Leo, ☾ lat. 1 44 N. ♄ lat. 1 36, diff. of lat. 8
3	10	0	0	☾ in conj. with σ in Leo
5	0	0	0	⊙ before the Clk. 11 m. 23s.
5	0	0	0	☿ Stationary
5	9	44	0	Eclipticconj. or ● new moon
8	16	0	0	☽ in conj. with γ in Libra
9	4	0	0	☽ in conj. with ψ in Libra
9	20	0	0	☽ in conj. with φ in Oph
10	0	0	0	⊙ before the Clock 12 m. 48 sec.
10	0	0	0	♃ Stationary
11	22	0	0	☽ in conj. with 2μ in Sag.
13	4	0	0	☽ in conj. with δ in Sag.
13	11	59	0	☽ in □ or first quarter
13	17	0	0	☿ in conj. with η in Virgo
17	20	0	0	☽ in conj. with φ in Aquarius
17	22	0	0	♂ in conj. with ϑ in Virgo
17	23	0	0	☿ in conj. with 1γ in Virgo
20	0	0	0	⊙ before the Clock 15 min.
20	14	0	0	☽ in conj. with ν in Pisces
20	20	44	0	Eclip. oppon. or ○ full moon
21	0	0	0	♅ Stationary
24	1	0	0	☾ in conj. with 2ξ in Ceti
22	21	0	0	in conj. with ϑ in Virgo
23	8	0	0	☾ in conj. with γ in Taurus
23	16	3	0	⊙ enters Scorpio
25	0	0	0	⊙ before the Clock 15 m. 45 sec.
25	10	0	0	☾ in conj. with ν in Gemini
26	0	0	0	☾ in conj. with ζ in Gemini
26	10	0	0	☿ in conj. with ♂ long. 21 in Virgo, ☿ lat. 1 43 N. ♂ lat. 38 N. diff. of lat. 1 5
27	12	2	0	☾ in □ last quarter
27	17	0	0	☾ in conj. with δ in Cancer
29	0	0	0	♀ Stationary
29	6	0	0	☾ in conj. with α in Leo
29	17	0	0	☾ in conj. with ρ in Leo
30	0	0	0	⊙ before the Clock 16 m. 10 sec.
30	9	0	0	☾ in conj. with ♄ lon. 12 in Virgo, ☾ 2 1 N. ♄ lat. 1 41 N. diff. of lat 20
30	16	0	0	☾ in conj. with σ in Leo

J. LEWTHWAITE.
Rotherhithe.

The waxing moon ☽.—the waning moon ☾

Meteorological Journal, 1831.

1831.	Thermo. Hig.	Thermo. Low	Barometer. High.	Barometer. Low.	Rain in inches.
Aug.					
26	71	43	29,89	29,86	
27	76	54	29,98	29,90	
28	70	49	30,11	30,02	
29	72	47	30,16	30,13	
30	73	47	30,09	30,00	
31	70	53	29,92	29,89	
Sept.					
1	56	43	29,90	29,75	
2	56	43	29,86	29,75	1,35
3	64	42	29,85	Stat.	,1
4	70	45	29,81	29,79	
5	71	50	29,88	29,84	
6	65	53	29,87	29,86	
7	65	42	29,86	29,71	,15
8	52	43	29,76	29,60	,025
9	56	40	29,60	29,56	,275

1831.	Thermo. Hig.	Thermo. Low	Barometer. Hig.	Barometer. Low.	Rain in inches.
Sept.					
10	63	47	29,84	29,73	,475
11	61	47	29,99	29,90	,025
12	65	50	30,15	30,09	
13	67	43	30,13	30,12	
14	65	51	30,09	30,07	
15	65	49	29,10	30,08	
16	63	49	30,16	30,14	
17	64	47	30,16	30,13	
18	67	47	30,10	30,00	
19	65	42	29,90	29,76	
20	61	39	29,82	29,81	,1
21	63	51	29,80	29,75	,35
22	65	42	29,94	29,81	,025
23	63	37	30,07	30,00	
24	64	41	30,14	30,11	
25	67	41	29,99	29,93	

THE

London

JOURNAL OF ARTS AND SCIENCES.

No. XLIV.

[SECOND SERIES.]

Recent Patents.

To Francis Molineux, *of Hampstead, in the county of Middlesex, gentleman, and* William Bundy, *of Kentish Town, in the same county, machanist, for their invention of improvements in machinery for spinning and twisting silk and wool; and for roving, spinning, and twisting cotton, flax, hemp, and other fibrous substances.*—[Sealed 21st September, 1830.]

This invention appears to consist of several modifications of machinery, all of which are designed to enable yarns of cotton, silk, or other fibrous substances, to wind on to bobbins simultaneously with the operation of spinning the material into yarns. The Patentees have described the invention by reference to their drawing, of which the following is for the most part a literal copy:—

Plate IV. fig. 1, 1 A, and 1 B, and 2, represent our improved arrangement of the spindle and flyer, applicable in the process of spinning various fibrous materials, which

improvement combines in its operation, the soundness and firmness of the throstle, with the fineness and delicacy of the mule.

Figures 1, and 1 A, represent a spindle, nearly similar to a throstle spindle; *a*, is a disk, or plate of iron, or other suitable material, fixed on the spindle at a suitable distance from the bobbin *b*, to rest on, which may be made of wood, or any other proper substance; *c, c, c*, represent a flyer inverted in position, and which may be made of any suitable dimensions; *d, d*, represent the flanches of a collar attached to the flyer, through which the spindle is allowed to pass, so as to admit of its revolving freely; *e, e*, represent two tempering springs of steel, which are so placed as to bear against the collar *d, d*, with a pressure, which may be regulated by the action of the screws *h, h*. The tempering springs *e, e*, are attached to the traversing rail *f, f*, by a plate of iron, as seen at *i*, by which means the flyer may be elevated and depressed by any of the ordinary modes of producing a traversing motion on the spindle, for the purpose of regularly filling the bobbin as the operation proceeds; *g*, is a pulley of the usual form, by which the spindle and flyer are put in motion.

Figure 1 B, represents an edge and sectional view of the tempering springs, by which their application is more distinctly seen: the same letters represent the same things as in figs. 1, and 1 A. In this our improved arrangement of the spindle and flyer, the tempering springs *e, e*, being made to press more or less forcibly against the collar or flanches of the flyer *d, d*, the speed or motion of the flyer is proportionably retarded, and is thus adjusted or tempered to suit the degree of retardation required for finer or coarser yarns; this object may either be effected by springs in the manner above described, or the retardation may be produced by any other convenient method of applying friction to the collar of the flyer. In this our improved arrangement the bobbin is fixed on the spindle, and is moved with the same speed as the spindle, which is essential in our improved method of spinning; the mode of operation above described possesses advantages over all methods heretofore in practice for adjusting the speed, so as to admit of the yarn spun being coiled or wrapped on the bobbin, without any injurious tension or strain. To effect this important object, it is only necessary to

produce a sufficient retardation of the speed of the flyer, by the application of friction, as before described, by which means the flyer, when in motion, will adapt itself to the exact speed required. This our improvement is applicable to any series of spindles, which may, without any material alteration of the other parts of the machine, be placed in any throstle or water frame, of the usual construction for spinning cotton; or any of the machines for spinning worsted or woollen yarn, flax or silk, may be adapted to receive our improved arrangement of the spindle and flyer, with but little trouble or expense.

Figure 2 *a*, represents a fixed spindle of iron or other suitable material, which passes through the bobbin *b*, and the tube *t*, to which the bobbin is fixed; *d*, *d*, represents a collar attached to the pulley *g*; *e*, represents a thin plate of iron, screwed to the traversing bar *v*, *v*, and connected to the frame *f*, *f*, by which the bobbin is moved up and down in any of the usual modes for regularly filling during the operation; *f*, *f*, is a wood frame, in which the spindle *h*, may be fixed or inserted, and screwed firmly by the nut *n*,; *c*, *c*, *c*, is a flyer, as in fig. 1; *s*, is a spring on the top of the spindle *a*, which is formed into a screw at the top, and which spring being pressed by the nut *m*, on the collar of the flyer, the motion of the flyer will be retarded in the proportion required, which retardation will be increased or diminished by the action of the nut *m*. In this, our improved arrangement of the spindle and flyer, we claim as our invention, the application of a flyer fitted loosely upon a spindle, and arranged in such manner as to admit of the application of friction by the action of springs or otherwise, to govern the speed of the flyer according to the degree of tension required for regularly filling the bobbin, which is adapted to and revolves with the spindle. Fig. 3, and figs. 3 A, and 3 B, represent an improved apparatus for spinning cotton or other fibrous material, and which we term a centrifugal spindle. Fig. 3, represents a centrifugal spindle, adapted to spin coarse yarns or threads; and fig. 3 A, represents the same arrangement, but adapted to spin finer yarns or threads: in each figure the same letters represent the same things.

Figure 3 A, *f*, *f*, *f*, *f*, represent a frame made of any convenient substance, having a whirl or pulley fixed to it at *h*, for the purpose of carryingthe frame by the action of

a band round the spindle *a, a,* which is fastened to a wooden frame; on the top of the spindle is fixed a wheel, bevelled round the circumference with a bevel corresponding with that of the wheel *c,* which is also bevelled and is firmly fixed to the arbor *d,* at *d,* having a pivot at either end of the arbor of sufficient length to allow it to play endwise in the frame, so as to allow the two bevel wheels to come in contact when in action; the arbor is destined to carry the bobbin *e, e, e,* to be made of wood or other proper material, which should fit loosely on the arbor; *w,* is a nut screwed up to a shoulder on the arbor D, having end play of the bobbin, which is not to be confined on the arbor; this nut *w,* serves also as a governor, according to its weight when screwed on the arbor *d*; that is to say, when the arbor carrying the bobbin *e,* and wheel *c,* is suspended on a perpendicular spindle, the nut end of the arbor should have a bias weight of a few grains; when thus adjusted, if the frame be made to revolve, the centrifugal tendency of the nut end of the arbor will bring the bevel wheel in contact with the wheel *b,* by which means the bevel wheel *c,* will be made to revolve on its axis round the fixed bevel wheel *b*; the bobbin *e,* is held on the arbor *d,* by the friction against the nut *w,* caused by a slender spring *l,* and when in action, the bobbin will be carried round with the arbor and wheel *c,* unless the tension of the twisting article should be enough to overcome the friction against the nut *w,* caused by the spring *l*; in this case the spring *l,* will require to be set stronger, which may be done by a screw at *m,* passing through the wheel *c,* and acting against the spring *l*; the slender spring at *n,* (which acts against the end of the arbor, as seen at *d,* fig. 3 A), is to check the recoil, which a sudden stop of the twisting motion would cause from the collapse of the centrifugal force, thereby throwing the bobbin off its taking up action. The spring *n,* should be only of strength sufficient to keep the bevel wheels in contact whilst out of action, which will prevent the recoil; *o, o,* as seen in the fig. 3 A, are the profiles of two pins of flat metal, fixed to the frame *f, f*; these are designed to act as preventors when a break down of the yarn occurs; to keep the end of the yarn from being gathered round the pivot of the arbor, which if allowed, would obstruct the free action of the power of the centrifugal force against the bevel wheel *c.*

The springs *r, r,* as seen at fig. 3 A, are to keep the pivots of the arbor in their respective places in the arms of the frame; the holes for these pivots are cut in the direction denoted in fig. 3 B, for the purpose of putting in and taking out the arbor with the bobbin; the profile of one of these springs *r,* is seen in fig. 3 B; the centre of the spindle *a,* is to be placed perpendicularly under the delivery of the line, which is to be taken up at a distance, according to the length of the bobbin; the size of the bobbin in drawing, requires about seven inches; the taking up will be assisted in its distribution on the bobbin by the rod *t,* as seen in fig. 3 A, and which rod *t,* is held at each end by the arms of the frame, and does not run parallel with the arbor on which the bobbin turns, but it is to form an angle across, according to the twist given to the article; if it be fine yarn (see fig. 3 B), the arms *f, f,* are to be bent to the right, as in the dotted lines, which shew how much they are to be removed from the perpendicular. If thread is the article to be taken up, the arms of the frame *f, f,* must be bent towards the other side of the perpendicular line, the angle of the rod from the parallel of the bobbin axis will prevent the twist given to the article, from causing it to ride on the last turn taken up on the bobbin. In this our application of the centrifugal spindle, to the purpose of spinning fibrous material, we claim as our invention, so much of the arrangement of machinery herein described, for the purpose of spinning or twisting, as admits of and gives effect to the application of the centrifugal force, for the purpose of taking up yarn or other twisted article, while the operation of spinning or twisting proceeds.

Fig. 4, and fig. 4 A, represent a further improvement in spinning machinery, which we term a gear spindle, and by which we are enabled to spin the finest yarns with more certainty and effect.

Figure 4, represents a front view, and fig. 4 A, represents a side view of an improved gear spindle; and the same letters in each figure represent the same things, but seen in a different position; *a, a,* is a spindle, supported by the bearings marked *b, b,* which are firmly screwed to a wooden frame; *c,* is a screw, accurately cut and placed on the top of the spindle *a,* but fixed to the bearing *b,* and which screw takes into and moves the pinion *d,* cut with concave inclined teeth, to match the screw thus moving

the shaft *e*, which forms the axis of the pinion *d*; *g*, is a pin toothed wheel on the end of the axis *e*, which takes into, and moves another pin toothed wheel *i*, on the end of the axis *h*; a screw *k*, is cut on the other end of the axis *h*, which takes into and moves two angle toothed wheels *n*, *n*, fixed on the socket *x*, at the end of the bobbin axis *l*, *l*, and which axis has a square end to fit the socket, for the purpose of effecting the change of the bobbin; the screw *k*, on the end of the shaft *h*, is made to act upon the angle toothed wheels *n*, *n*, by the frame *e*, being reduced at the bearing to permit the contact of the screw with the wheels, and the socket *x*, is kept in its bearings by the position of the screw *k*.

On the shaft *h*, *m*, is a bobbin made of wood or other suitable material; *o*, *o*, are friction bosses to adjust the friction against the bobbin; *s*, is a spring to keep the axis of the bobbin in its proper place; *f*, *f*, *f*, is a frame, which we call the bobbin frame, made of brass, to support the axis of the bobbin *l*, *l*, which frame is fixed to the top of the spindle *a*, *a*, and supports also the pin wheel shaft *h*; the lower part of the frame *f*, *f*, is enlarged on the side opposite the shaft *e*, *e*; to balance that shaft, and the shaft *h*, with the supporting frame *p*, is a pulley on the spindle *a*, by means of which the whole machinery is put in motion; *s*, is a screw to keep the spindle *a*, *a*, in its proper position. In this our improved gear spindle, the moving power is applied to the pulley *p*, which acting on the spindle *a*, *a*, moves the frame *f*, *f*, round the stationary screw *c*, placed on the top of the spindle *a*, and which by acting upon the pinion *d*, moves the shaft *e*, and the pin toothed wheels *g*, and *i*, and with the latter the shaft *h*, and the screw *k*, and this screw moves the angle toothed wheels *n*, *n*, on the socket of the bobbin axis *l*, *l*, by which means a motion of the bobbin is produced distinct from that of the spindle *a*, *a*, and the motion of the bobbin thus produced may, by properly adapting the gearing, be so adjusted as to insure a regular and uniform taking up, or coiling of the yarn or thread upon it, as the operation of spinning proceeds.

In this our improvement a traversing movement is not required, the action or whirl of the bobbin being sufficient to insure a uniform filling of the same. This our improved gear spindle may be placed horizontally, perpendicularly, or at any angle with the rollers, but we prefer

placing it at an angle of 45°, under which arrangement it receives directly the fibrous material, drawn to its proper substance by the rollers of the drawing head, and which is twisted and coiled on the bobbin with uniform regularity.

This our improved gear spindle is particularly adapted to spin fine yarns of the most delicate texture, greatly superior in evenness and strength to the mule, the machine usually employed to spin fine numbers, and any convenient number of our improved gear spindles may be placed in a machine; they will occupy but little space, and may be put in motion by any convenient arrangement adapted to secure a uniform speed in each of the spindles. In this our improved gear spindle, we claim as our invention the above described arrangement of machinery or gearing, by which we produce a motion or speed in the bobbin different from that of the spindle, and so adjusted as to take up the yarn or thread as it is delivered and twisted during the operation of spinning.

Fig. 5, represents our improved gear spindle, as applied to roving or spinning cotton, flax, or wool, or other fibrous substances; *a, a,* is a shaft or spindle, on the top of which is placed a worm or screw *b,* fixed fast to the frame *q*; the frame *o, o,* which revolves round the screw, takes into and moves the pinion *c,* on the shaft *d, d*; a screw or worm *e,* on the shaft *d,* takes into and moves the pinion *g,* on the bobbin axis *h*; *i, i,* is a roving bobbin, which is moved by its axis *h,* on the pivot *n*; *m,* is a lever, to facilitate the changing of the bobbin; *k, k,* is an iron frame; *l, l,* is a guide rod, into which is fixed the small pulley by which the roving is coiled on the bobbin; *n,* is a brass tube, down which the roving or yarn is conducted to the pulley *m,* and to the bobbin *i.* The whole machinery is put in motion by the pulley *p*; *o, o, o,* is a frame to support the bobbin *i, i*; the shaft *d,* and the gearing *q, q, q,* are parts of a frame, in which any convenient number of these our improved spindles may be placed, each spindle being of similar construction. The moving power is applied to the pulley *p,* which moves the frame *o, o, o,* round the stationary screw *b,* and this acting upon the pinion *c,* moves the shaft *d,* and the bobbin *i,* by the arrangement of gearing hereinbefore described; by properly adapting the proportions of which, the speed of the bobbin may be adjusted to receive the yarn or roving, as

it is delivered by the rollers. The twist is given by the motion of the frame *o, o, o,* which is carried round, together with the traversing pulley *m,* by the operation of the pulley *p,* as before described. The traversing is effected by means of the pulley *r,* which conducts the yarn or roving to the bobbin, and is moved up and down by the rod *l, l,* which passes through and revolves with the spindle *a, a,* and is acted upon by a heart, or by any of the usual mechanical means for producing a traversing motion.

Fig. 6, represents another mode of applying our improved gear spindle to the operation of spinning; *a, a,* is a shaft or spindle, on the top of which a worm or screw *c,* fixed fast to the frame *q,* is placed, and round which the frame *o, o,* revolves; by this means the screw *c,* moves the pinion *b,* on the shaft *c*; a worm or screw *d,* on the shaft *c,* moves the pinion *h,* on the bobbin axis *i, i*; *k,* is the bobbin; *m,* is a pulley at the top of the traversing shaft *n,* which passes through a tube in the gear spindle *a, a,* and is moved up and down by a traversing motion, to be produced in any of the usual modes; *o, o,* represents a part of the frame which supports the bobbin and gearing; *q, q,* represents part of the wooden frame of the machine; *p,* is the pulley to which the moving power is applied.

The method by which this application of our improved gear spindle is put in motion, is nearly similar to that described with reference to fig. 5; the moving power applied to the pulley *p,* moves the spindle *a, a,* and the frame *o, o,* round the stationary screw *c,* and which puts in motion the gearing, by which the speed of the bobbin is adjusted to take up the yarn as it is produced by the operation of spinning; the yarn or thread receives its twist from the motion communicated to the frame *o, o,* by the screw *c,* moved by the spindle *a, a,* and in this arrangement the fibrous material descends from the drawing head to the guide pulley *m,* where it is twisted and conducted to the bobbin, on which it is regularly wrapped or coiled by the operation of the usual traversing motion.

Figure 7, represents an improved roving spindle, regulated and adjusted by the application of conical surfaces, to take up with the required regularity; *a,* represents an axis or shaft on which the pulleys *p, p,* are fixed; the shaft *a,* works in a step *b*; *c, c,* is a piece of frame

supported by columns, as seen in the drawing; *d*, is a piece of brass or other suitable material turned to a conical surface, and fixed fast on the cross frame or plate *c*. The frame *e, e, e*, placed loosely on the top of the axis, revolves freely on the tube *g*; *h*, is a bobbin; *i*, is a conical wheel made of brass or other material, adapted in its diameter to suit the speed of the bobbin; the conical wheel *i*, is fixed on the axis *k*, which passes through the frame *e, e, e*, and forms an axis for the bobbin *h*; *n*, is a spring, by which the pressure of the conical wheel *i*, against the cone *d*, is regulated; *m*, is a nut operating on the end of the axis *k*, which is formed into a screw, and this nut presses upwards against the conical pulley to regulate its position on the shaft *k*; *s, s*, is a lever, by means of which the axis or pin *q*, is elevated or depressed to facilitate the change of the bobbin; *r*, is a traversing rod, which is caused to be moved up and down by any of the ordinary means for producing traversing motion; *t*, is a pulley, at the top of the traversing rod, to receive the roving from the tube *g*, which conducts the roving to the bobbin *h*; *w, w*, represent a frame of wood, which may be of any construction adapted to receive the conically adjusted spindle; *v*, is a collar to support the tube *g*.

In this our improved roving spindle for regulating the speed so as to take up with the required regularity by the adjustment of conical surfaces, the moving power is applied to one of the pulleys *p, p*, which moves the frame *e, e, e*, round the stationary cone *d*; the conical wheel *i*, is moved by being pressed against the fixed cone *d*, which moves the bobbin *h*, at the required speed, so as to take up the roving as it is delivered from the drawing head. The twist is given by the motion of the frame *e, e, e*, which revolves freely on the axis *a*, and the tube *g*, which tube conducts the roving to the pulley *t*, and the bobbin *h*. Any convenient number of these conically adjusted spindles may be placed in a roving machine, and put in motion by the machinery usually employed.

In this improved roving spindle, we claim as our invention the described arrangement of machinery, by which the adjustment of the speed of the bobbin, so as to take up with the required regularity, is effected by means of conical surfaces applied to each individual spindle.

Fig. 8, and fig. 8 A, represent our further improved machinery for spinning fine yarns: in each figure the same letters indicate the same things; *a, a,* is a fixed axis, to be firmly screwed to the frame *b*; *p*, is a pulley, fixed on the tube *g*, which tube is fixed to the frame *d, d; e, e,* is a frame placed within the frame *d, d,* to support the shaft *n*, and the shaft and pulley *h*; *c*, is a screw or worm on the top of the axis *a*, round which the frame *d, d,* moves, taking into and moving the pinion *o*; *i*, is a pinion on the shaft *r*, which works the wheel *k*, on the pulley shaft *h*; *l, l,* is a piece of cloth or silk fitted to the pulley *h*, and the pully *m*; *q, q,* are pins fixed in the cloth *l, l,* which pass through holes seen in the drawing, and the longitudinal spaces shewn in the pulley *m*; *t, t,* is a tube for the yarn to pass through, as it descends to the cloth bobbin *l, l*; *v*, is a piece of frame, which may be extended to receive any number of these our improved spindles and bobbins.

In this our improvement in the application of the gear spindle, and the cloth bobbin, the power is applied to the pulley *p*, which moves the frame *d, d,* round the stationary screw *c*, and this screw acting upon the pinion *o*, moves the shaft *r*; the pinion *i*, on the shaft *r*, acting on the wheel *k*, moves the pulleys *h*, and *m*, which gave motion to the cloth bobbin *l, l,* the pins *q, q,* being fastened to the cloth bobbin, project and take into the open pulley *m*, by which means a regular and steady motion of the bobbin is secured, and the pins projecting upwards from the cloth bobbin, form a protection to the yarn, to keep it in place during the operation of spinning.

As the yarn is spun, it descends from the drawing head through the tube *t*, where it is twisted and passes on to the cloth bobbin *l, l,* which has a distinct and separate motion adjusted, to ensure a regular take up of the yarn; this is effected as in our improved gear spindle, by the arrangement and proper adaption of the gear to produce the rate of speed required; *n, n, n,* represents a frame of iron, constructed to support on their axles the pullies *m*, and *h*, over which the flexible sheet *e, e,* is tightly suspended; *z*, is an iron pin, which supports and forms the axis of the pulley *h*, and which axis being moveable, the successive changes of the flexible sheet and pullies is effected. The frame *n, n, n,* is fixed into the frame *e*, at

the top by the pivots *y, y,* and the frame *n, n, n,* is enlarged at the centre *w,* to admit of its being suspended on a shaft when taken out of the machine, convenient for reeling or winding off the yarn or thread.

In this our further improved machinery, we claim as our invention, the application of a cloth bobbin, or flexible sheet, for the purpose of receiving the yarn, by means of which the measure of tension consequent upon the filling of the bobbin, in the usual modes of spinning, is rendered trifling, and we claim the described arrangement of machinery for effecting that purpose.

Fig. 9, represents our improved machinery for doubling and twisting cotton, silk, flax, worsted or woollen yarns, or threads; *a, a,* is a bobbin, placed loosely on the pivots or axis *b, b,* and on which bobbin has been placed by winding the silk or yarn intended for the operation of doubling; *s,* is a spring, to keep the bobbin in its proper place, and to facilitate the change; *c, c, c,* is a frame, in which the bobbin pivots are placed, and which frame is fixed on the tubular spindle *d, d,* to which the pulley *p,* is also fixed; the tubular shaft *d, d,* is moveable on bearings, placed on the carriage or peak *e, e,* which is screwed to a frame of wood by the screw *f, f, f, f*; *t, t,* is a tube, through which the yarn or thread descends to be twisted; *g,* is a screw, fixed to the carriage *e, e,* round which the pinion *h,* revolves; the frame *i, i, i,* supports the pinion shaft *k, k,* the pinions *h,* and *l,* also the wheel *m,* and the shaft *n, n,* on which the measuring pulley *o,* is fixed; *q,* is a guiding eye of wire, to receive or conduct the silk or thread to a doubling spindle constructed in the usual way.

In this our improved doubling machine, the power is applied to the pulley *p,* which puts in motion the tubular shaft *d, d,* which shaft moves the frame *c, c, c,* and the frame *i, i, i, i,* round the stationary screw *g,* which moves the pinions *h,* and *l,* the wheel *m,* and the shaft *n*; in thus giving a distinct motion to the measuring pulley *o,* and round which the silk or thread makes one turn or fold, so that an exact quantity or length of silk or yarn shall be drawn off the bobbin *a, a,* so as to receive any required number of turns or given quantity of twist in a given length, the amount of the twist being regulated by the action of the measuring pulley *o,* from which it passes to the guide wire *q,* and from the guide *q,* to a guiding eye with a moveable centre part, perforated with two or three

tubular holes, through which the several silks or yarns pass, previous to their being united in one thread, by the operation of a doubling and twisting spindle of the usual construction.

Two or three of these our improved measuring and twisting spindles may be employed at the same time, according to the article required, each measuring and giving an exact twist to their several silks or yarns, which yarns will all unite after passing the guiding eye, and twist into the article required by the usual doubling spindle any convenient number of these our measuring spindles may be employed in one machine, and they will be found to produce a superior article in silk, and other threads requiring the process of uniform doubling and twisting.

In this our improved machinery for doubling and twisting, we claim as our invention, the application of a distinct measuring roller to each individual spindle, by the described arrangement of machinery, for the purpose of giving twist to the single yarns, previous to their being united together into threads or silks.

Figure 10, is another mode of applying our improved machinery for doubling and twisting; *b, b, b,* is a frame to support the bobbin, and is fixed to the tubular shaft *c, c, c, c*; *d,* is a screw, placed on the tube shaft *c, c,* but fixed to the frame *f*; *e, e, e,* is a frame of brass, screwed to the end of the tubular shaft *c, c,* and this frame supports the shaft *g,* and *h,* and also the pinion and wheel *i,* and *k,* together, with the measuring pulley *m*; *p,* is a pulley on the shaft *c, c,* by means of which the whole is moved; *f, f, f, f,* represent pieces of a wood frame, on which any required number of these our improved measuring and twisting spindles may be placed or fixed in their bearings; *t, t,* is a tube, through which the silk or yarn passes to the measuring pulley *m.*

This our improved twisting and doubling machine is moved by the application of power to the pulley *p,* which moves the tubular shaft *c, c, c,* to which the frame *b, b,* and the frame *e, e, e,* are fixed; the bobbin *a,* moves with the frame *b,* and the frame *e, e, e,* moves round the fixed screw *d,* which moves simultaneously the pinion *i,* the shaft of the wheel *k,* the shaft *h,* and the pulley *m*; the silk or yarn is wrapped on the bobbin *a,* and passes down the tube *t, t,* to the measuring pulley *m,* by which it is

uniformly drawn off the bobbin, receiving a given quantity of twist in a given length, and is conducted by the guide *n*, to a doubling and twisting spindle of the usual construction; any number of these our improved measuring and twisting spindles may be used, as the article intended to be made may require. The apparatus described in fig. 10, exhibits one of the modes of applying the invention described in fig. 9.

Figures 11, 12, and 13, represent our further improvements in machinery for doubling and twisting silk, cotton, or any yarns or threads that require such operation.

Fig. 11, represents a geometrical elevation of our improved bobbin frame, in which are placed bobbins supplied with silk or yarn, prepared for doubling; by winding on each bobbin a single silk or yarn, each frame is calculated to hold six bobbins; *a, a, a,* represent our improved doubling and twisting spindle; *c, c, c,* represent the axles of our improved bobbin frames; *d, d, d,* represent the bobbin frame; *b, b, b,* &c. represent the bobbins placed in the frames; one of the frames is seen in front, and presents the length of the bobbins; the other two are seen at the side, presenting the bobbin ends; *e, e, e,* &c. represent the conducting rollers, over which the silk or yarn passes to be twisted; *g, g,* &c. represent supports, which are attached to the frame *d, d,* and in which the conducting rollers *c, c, c,* &c. are suspended on their axles; *h, h, h,* are fixed pivots, on which the axles *c, c, c,* revolve; *f, f,* is a plate of brass, or other suitable material, which supports the pivots *h, h, h*; *j, j,* represent the bottom plate, in which the tubes *i, i, i,* are fixed; *k, k,* are iron stays or braces, to connect the top plate *f, f,* with the bottom plate *j, j*; *m,* is a collar to support the plates and the bobbin frames in their proper place on the spindle *a, a*; *l, l,* represent connecting bars or frame work, by which the top frame *n, n,* is connected with the frame *o, o,* which supports the spindle *a, a,* and the latter is perforated at *q,* by the holes or tubes through which the silk or yarn passes to the measuring pulley *p,* fixed on the frame *r, r,* which is connected to the frame *o, o,* by the braces *s, s*; *t,* is a pulley, on the spindle *a, a*; *v, v, v,* are pulleys, one on each of the bobbin frame axles *c, c, c*; *w, w, w,* is a stationary band of any suitable material, fastened at one end to the spring *x,* and at the other end to the screw *y*; *z, z,* &c. represent a regulating spring, fixed to the pivot

of the bobbin axis, which being adjusted by means of the screw E, E, &c. regulates the friction against the axis, to suit the tensions on the bobbin to the strength or delicacy of the silk or yarn.

Fig. 12, represents the top plate *f, f,* which shews the relative position of the bobbin frame axles *c, c, c,* and the connecting rods *k, k, k; w, w,* is the stationary band, shewn, connected to the spring *x,* and the screw *y,* which spring and screw may be attached to any convenient part of the stationary framing.

Fig. 13, represents the ground plan or bottom plate *j, j,* in which the guiding tubes *i, i, i,* are fixed centrally under the bobbin frame *d, d, d; a,* represents our improved doubling spindle, passing through the plate *j, j; k, k, k,* represent the connecting rods, by which the plates *f, f,* and *j, j,* are firmly attached together.

In this our improved twisting and doubling machinery, a moving power is applied to the pulley *t,* which moves the spindle *a, a,* to which the plates *f, f,* and *j, j,* are fixed, causing the bobbin frames *d, d, d,* to move on the axles *c, c, c,* but the band *w, w, w,* being stationary, motion is given to the bobbin frame axles *c, c, c,* in a direction opposite to that of the spindle *a, a,* and the plates *f, f,* and *j, j.* Single threads of silk or cotton, or other material, having been put on the bobbins *b, b, b,* &c. &c. pass over the guide rollers *e, e, e,* &c. and are united together by twisting at the tubes *i, i, i,* through which they pass to the conical end *q,* of the spindle *a, a,* and thence through the perforations or tubes in the cone *q,* to the measuring pulley *p,* round which the silk or threads make one turn or fold, to insure a uniform twist in a given length from the measuring pulley *p,* the silk passes to a detached reel or bobbin, as may be required.

Six single threads of silk, one from each bobbin, are drawn off from each bobbin frame by the machinery, and descend to the tube *i,* and there receive the intended twist from the operation of the stationary band *w, w, w,* and the spindle *a, a,* moving in the opposite direction; these three threads are again united by the operation of the cone *q,* and form a silken cord or cable, consisting of eighteen threads, which may be laid or twisted in such degree or proportion as the nature of the article may require; any convenient number of threads may be thus

operated upon, and any quantity of twist may be given, at the option of the manufacturer.

In this our improved bobbin frame, we claim as our invention the described arrangement of machinery for doubling and twisting silk, cotton, or any other yarns or threads that require the operation.

Figure 14, represents the method of applying our improved doubling and twisting machinery, with the flexible sheet or cloth bobbin, to the purpose of twisting and doubling single silks or yarns that may require such process.

A, A, indicates our improved twisting spindle, with a conical end, perforated with holes at *q*, a geometrical and end or profile view of a frame adapted to receive the cloth bobbin, or flexible sheet is presented; *b, b, b, b*, is the frame; *c, c, c, c*, the flexible sheet; *d, d*, are pullies supported on their axis, by the frame *b, b*, over which pulley the cloth bobbin or flexible sheet passes, and to which it is fitted, so as to move with the pullies; *e*, is a wheel on the end of the pulley shaft *d*, which is moved by the smaller wheel *f*; *g, g*, are tubes, on the top of which are fixed the worms or screws *h, h*, which tubes and worms or screws are fixed fast in the frame *i, i*; *k*, is a shaft, on which the pinion *l*, is fixed; *p*, is a collar, on the spindle *a*, to support the plates *i, i*; *m, m*, are pivots screwed into the frame *j, j*, on the ends of which the bearings *n, n*, work; *o, o*, are pullies, by which the frame of the cloth bobbin is put in motion, and which give twist to the single silks or yarns; *r, r*, are connecting bars which join the plates *i, i*, and *j, j*, firmly together by screws in the usual way; *s*, is a spring, fixed to the framing of the machine, and to which one end of the stationary band *t, t*, is fixed, and which band is fastened at the other end to any convenient part of the stationary frame so as to permit the band *t, t*, to act freely on the pullies *o, o*, when the machine is at work; on the spindle *a, a*, is fixed the pulley *v*, by which the machine is put in motion, and on which spindle the plates *i, i*, and *j, j*, are firmly fixed.

In this our improved arrangement of the gear spindle, and the cloth bobbin or flexible sheet, motion is communicated to the pulley *v*, by the usual means, which moves with it the plates *i, i*, and *j, j*, and which by the action of the stationary band *t, t*, the bobbin frames *b, b*, receive

motion in a direction opposite to that of the spindle *a, a,* by which the single silks or yarns are twisted at the tubes *g, g.*

The bobbin frames move round the stationary screws or worms *h, h,* by which the pinion *l,* on the shaft *k,* is put in motion, and the wheel *f,* on the end of the shaft *k,* takes into and moves the wheel *e,* on the end of the pulley shaft *d,* which gives motion to the cloth bobbin, and permits the silks or yarns to be drawn off without injurious tension or strain; the silks or yarns being drawn off, or delivered by the flexible sheet, and twisted at the tube *g, g,* are united and twisted in the opposite direction, and form one thread at the cone *q,* and from thence are conducted to a measuring pulley, as seen at fig. 11, and thence to a reel or bobbin of the usual construction; a particular description of the stationary band and its action on the pulleys to produce a reverse motion, are particularly explained in fig. 11, and its references; and the arrangement of the gear is a modified application of our improved gear spindle, described at fig. 4, and fig. 4 A. The change of the flexible sheet is effected by the same method as described in fig. 8, for spinning.

In compliance with the proviso contained in the royal grant as aforesaid, we have herein described our invention and improvements in such manner, that by reference to the drawings, any competent machinist will be able to construct the same; and this our improved machinery may be constructed of any suitable material convenient to the machine maker.—[*Inrolled in the Rolls Chapel Office.*]

To ALEXANDER BELL, *of Chapel Place, in the borough of Southwark, engineer, for his having invented certain improvements in machinery for removing wool or hair from skins.*—[Sealed 4th November 1830.]

IN preparing the down or beaver for the manufacture of hats, it is necessary, before shearing or cutting the down or beaver from the skins, to draw out the coarse long hairs which stand up above the down. This has been

usually done by the hands of women and children, and is technically termed pulling. The object of the present invention is to supersede this tedious and expensive process by the employment of a machine, in which the skin is progressively brought up to a pair of revolving pincers, which take hold of the ends of the hairs as the skin passes through the machine, and draw the hairs out, leaving the fine down or beaver upon the skin to be afterwards removed by the ordinary process of shearing or cutting.

The revolving pincers above mentioned consist of a pair of rollers, round each of which is coiled a spiral rib, and the edges of these ribs running in contact with each other, and taking hold of the ends of the hairs like pincers as they go round, draw the hairs out of the skin, and leave the soft down thereon untouched. In the accompanying drawings (see Plate VI), is exhibited the machine as seen in various positions, the several parts being referred to by corresponding letters in all the figures.

Fig. 1, is a front view of the machine, shewing the situation of the revolving spiral pincers and their mode of operating; fig. 2, is a horizontal or top view, in which the skin is seen passing through the machine; fig. 3, is a side elevation of the machine, and fig. 4, is an elevation of the reverse side, fig. 5, being a longitudinal section taken through the middle of the machine in a vertical direction, seen in the same position as fig. 3; *a, a,* are a pair of fluted rollers, which conduct the skin forward in a distended flat sheet under the breast bar *b,* over the edge of which it is drawn by the roller *c.* The pincers are formed by two spiral ribs, fixed round the rollers *d,* and *e,* which act against each other as they revolve in opposite directions.

In commencing the operation, the neck part of the skin is introduced between the rollers *a, a,* the furry surface

of the skin being downwards. The pivots of these rollers turn in slots in the brackets *f, f,* affixed to the sides of the wood frame, and the rollers are pressed together by weighted levers *g, g,* which cause them to hold the skin tightly, but allow the upper roller to rise when necessary, and accommodate itself to the unequal thicknesses of the skins passed between. The skin is then carried forward a short distance by turning the cross handle *h,* on the end of the axle of the lower roller *a,* and the end of the skin is passed over the edge of the breast bar *b,* by the fingers of the operator, with the assistance of a small hook. The clips *i,* are then affixed to the end of the skin, for the purpose of drawing it by means of the strap and weighted roller *c.* It will be perceived that the hairs on the skin in passing over the edge of the breast bar *b,* project in the direction of the pincers *d, e,* and in order to bring up the skin, so that the hairs may be taken hold of by the pincers, (their lengths varying in different skins), the breast bar may be adjusted by turning the milled head finger screws *k, k;* the pincers, as before stated, are formed by spiral ribs, fixed round the rollers *d,* and *e,* which ribs act as teeth of a wheel and pinion, bearing against each other; the sectional figures of the ribs therefore should be accurately made as teeth in epicycloid curves, and they should be bent round the cylinders or rollers *d,* and *e,* in such helical curves as the points of contact would describe in travelling along the roller from end to end during one revolution; fig. 6, is a detached representation of the pincers in section, shewing the situation of the points of contact when taking hold of the hairs; and as the ribs continue in contact holding the hairs, as the rollers turn in the direction of the arrows, the hairs will be drawn out with their roots, and after being thus removed from the skin, the hairs will be let fall from the pincers, by

the time that the points of contact have reached the situation shewn in fig. 7.

The skin being placed in the machine in the manner above described, and shewn in the figures, that is, passed between the fluted rollers *a, a,* and brought over the edge of the breast bar *b,* the machine is then put in motion by means of a band passed round the rigger or pulley *l,* which drives the lower pinching roller, and the spiral rib of that roller acting against the spiral rib of the upper one, they both revolve together, for the purpose of pinching and drawing out the hairs in the way already described. It is necessary here to state, that I find it desirable to cover the spiral rib of one of the rollers with some soft substance, in order to afford elasticity at the points of contact, otherwise the hairs would be liable to be cut by the hard surfaces of the metal ribs; for this purpose I usually apply a coating of Indian rubber, and cover it with a strip of leather.

In order to keep the spiral rib of the upper roller *d,* in continual contact with that of the lower one, I find it necessary to put a small degree of friction upon the axle of the upper roller, which I do by affixing a pulley *m,* upon that axle, and carrying a catgut band round it, and round a small pulley *n,* which turns upon a pivot fixed to the side of the wood frame below; this pulley *n,* carries a fan *o,* which being driven round by the rotation of the upper roller, by means of the pullies and band, meets with so much resistance from the air, as is sufficient to produce the friction required.

For the purpose of driving the fluted rollers *a, a,* which carry the skin forward, I place an excentric roller *p,* on the end of the axle of the lower spiral, which as it revolves, actuates a pall or click *q,* that takes into the teeth of the ratchet wheel *r,* affixed on the end of the axle of

the lower fluted roller, and hence as the click moves to and fro, it draws the ratchet wheel round one tooth at every stroke, which causes the roller *a, a,* to advance the skin progressively to the breast bar as the pincers draw out the hairs.

In pulling the hairs from such skins as may be ragged and tender, it is necessary to diminish the speed of the machine, in order to give time for the operator to adjust the different parts of the skin, and prevent it from tearing; this is done by fixing upon the wood frame of the machine a swinging carriage, which turns upon a pivot at *s*; in this swinging carriage is mounted a pair of tension pullies *t, t,* the driving band passing between them. When it is wished the machine should work with its full speed, the pullies *t, t,* are to be placed in the situations shewn by dots in fig. 3, which is done by the operator pressing his foot upon the treadle *u,* when by means of the connecting rod *v,* the lever *w,* is brought down, and with it the swinging carriage into the dotted position, and the band being drawn out of the straight line, is made to embrace the driving rigger tightly; but when it is desired to impede the velocity of the machine, the treadle must be allowed to raise with it the lever of the tension pullies *t, t,* which relaxes the band, and permits it partially to slip round the rigger, consequently driving it with less speed; and when it is desired to stop the machine, the foot of the operator must be removed from the treadle, which allows it, and also the pullies *t, t,* to assume the situation shewn in the Plate at fig. 3, and at the same time to bring the break *x,* up into contact with the periphery of the fly wheel *y.*

In conclusion, the Patentee says, though I have described the complete construction of a machine adapted for pulling or drawing the hairs out of the skins of beavers and other animals, yet I do not intend to confine myself to the par-

ticular construction or combination of mechanism which is above described and exhibited in the drawings, as my invention of "improvements in machinery for removing wool or hairs from skins," consists in the adaptation of a pair of spiral or helical ribs or bars, which by revolving in contact, are enabled to take hold of and draw out the hairs from skins in the manner above described, or by any other construction of mechanism which may enable the said spiral or helical ribs or bars, either with or without a central roller or shaft, to revolve upon their axes in contact with each other, or by one of the said spiral rollers acting against an elastic roller, by indenting into the surface of which a counterpart of the pincers may be produced, so as to draw out the hairs from skins for the purposes above stated.—[*Inrolled in the Rolls Chapel Office, May,* 1831.]

Specification drawn by Messrs. Newton and Berry.

To George William Turner, *of the parish of St. Mary, Magdalen, Bermondsey, in the county of Surry, paper maker, for his invention of certain improvements in machinery or apparatus for making paper.*— [Sealed 21st March, 1831.]

My improvements in machinery or apparatus for making paper, consist in the construction and employment of a peculiar kind of sieve or strainer, designed to arrest the knots, lumps, and other matters, which may be in combination with the fine fibres of the pulp in its passage to the mould or wire web on which the paper is made.

These improvements enable the Patentee to dispense with the common vat and hog, in which the pulp for making paper is mixed with water, and agitated imme-

diately before it flows on to the wire gauze or endless web of a paper making machine, constructed upon the principle of Fourdrineir's Patent, or any other paper making machine of like character; and which said sieve or strainer may be also applied with great advantage to the common vat, used for hand made papers.

It is proposed to construct these sieves of a circular form, by combining any desirable number of concentric rings of metal, smoothly formed, with small openings between them, that is from about a 50th to 100th part of an inch apart; the sectional figure of which metallic rings is preferred to be that of a rebate nearly resembling the letter L, but inverted. This series of rings are to be attached to radial arms, mounted upon a central axle or spindle, as shewn in Plate V, fig. 5, which is a representation of the skeleton wheel or radial arms *a, a, a, a,* that the said concentric metallic rings are to be mounted upon the outer ring *b, b, b,* being cast with, or firmly attached to the arms in the first instance.

Fig. 6, is a plan view or representation of the horizontal surface of the sieve, consisting of the concentric rings mounted upon the radial arms with the concentric apertures or spaces between them severally shewn; fig. 7, is a section taken vertically through the sieve, exhibiting the concentric rings, as seen edgewise, bearing upon the radial arms.

The rings are usually attached to the arms by small screws, but they may be fixed by soldering or in any other convenient way, and the whole is circumscribed by a hoop of thin metal *c, c, c,* which completes the sieve.

The Patentee says, though I have stated that I prefer to construct the sieves by a combination of rings, formed in the shape nearly resembling the letter L, (inverted), yet I do not confine myself to that particular construction as

I sometimes make a frame, consisting of radial arms with rings or hoops, either cast to the arms or affixed thereto concentrically, at about a quarter of an inch apart, and by solder or otherwise attach to the upper level surfaces of the said frame of hoops; a circular plate of metal, which I then place in a lathe, and by a fine parting tool, cut through the plate the apertures or narrow spaces intended to form the sieve.

Under some circumstances, in place of the thin metal plate, or upper surface, I should construct the face of the sieve of wire, by placing several rings of wire close to each other, side by side on a level or plane, which wires I should fasten together, either by solder or by cross wires, and at distances of about half an inch apart; I should leave the circular concentric spaces as above described, for the passage of the fine fibres of the pulp; or I perhaps may find it convenient to construct the said sieves by affixing segment pieces to the frame or arms, as shewn at fig. 8; or the purpose might be answered tolerably well by attaching straight bars or wires in poligonal angles, as fig. 9, my object being the construction of a sieve or sieves, which shall be capable of revolving, and that the interstices of the said sieves shall be long apertures, corresponding, or nearly so, with the rotary wave, in which the pulp flows through and under the sieve.

I generally make the said sieves from about twenty-four to thirty inches in diameter, and the upper surface of the rings, forming the face of the sieve, about half an inch in breadth, the outer ring or hoop being about eight inches deep.

The mode by which I adapt these sieves to a paper making machine is shewn in fig. 10, which is a horizontal representation of the apparatus; and fig. 11, is an elevation of the same, partly shewn in section; *d, d, d,* is a

trough or shoot that conducts the paper pulp and water to the sieves *e, e, e, e,* of which it is proposed to employ two to one machine.

These sieves, each mounted upon a central spindle *f, f,* are suspended in the box *g, g,* in horizontal positions, the face or upper surface of each sieve being, when stationary, about half an inch above the top of the pulp and water in the box *g,* which box is substituted in place of the ordinary vat.

The upper extremities of the spindles *f, f,* pass through the bosses of the beam *h, h,* and are held up by nuts *i, i,* the beam being allowed to vibrate upon pivots at *j,* bearing on the fixed frame *k, k,* and the spindles pass through guides *q, q, q, q,* for the purpose of keeping the sieves truly horizontal.

On one of the spindles *f,* a pulley or rigger *l,* is fixed, over which a band or cord passes from any convenient moving power, for the purpose of giving rotary motion to the spindle *f,* and its sieve; and another pulley *m,* fixed on the same spindle, carries an endless band *n,* to a similar pulley *m,* on the spindle of the other sieve, hence, when the pulley *l,* is driven, both the spindles and their sieves are made to revolve.

In order to facilitate the passage of the fine pulp and water, the sieves receive an up and down motion through the agency of the vibrating beam *h,* the end of which is connected to a rod *o, o,* the lower part of that rod being attached to a revolving crank *p.*

From this arrangement it will be perceived, that if a rapid rotary motion be given to the shaft of the crank *p,* the beam *h,* will be made to vibrate, and consequently to raise and depress the sieves in the box *g,* with the same quick motion as that of the crank.

The effect of this rapid raising and depressing of the sieves will be, that a partial vacuum will be produced beneath each sieve as it rises, which will cause the air above to assist in carrying the fine fibres of the pulp through the interstices of the sieve, and in the descent of the sieves, the pressure of the liquid will force upwards any lumps or other matters which might otherwise obstruct or clog up the interstices of the sieves, and by the rotary motion of the sieves on their spindle, as above described, the fine fibres of the pulp are kept in continual agitation, and prevented from subsiding, which supersedes the necessity of the hog employed in other paper making machines.

The coarse parts of the pulp, that is, the lumps and knots being thus prevented from passing, are retained in the sieves, and may be removed from thence from time to time as shall be found necessary, while the finer parts or fibres of the pulp having passed through the sieve into the box *g*, below, it flows from thence, over the lip *r*, on to the ordinary wire web of the machine in the usual way, and is then made into paper.

The Patentee says, in conclusion, I desire it to be observed, that the invention which I claim under my above recited Patent, is the peculiar mode of constructing a sieve or sieves above described, to be employed for the purpose of clearing the pulp prepared for making paper from its knots, lumps, and other matters, that may be mixed with the pulp; and which sieves I adapt to paper making machines, giving them rotary as well as up and down motion, either by the mechanism shewn or by any other convenient means for effecting the same object; and which said sieves are also applicable to, and may be

adapted to the ordinary vat for making paper by hand moulds.—[*Inrolled in the Rolls Chapel Office, September,* 1831.]

Specification drawn by Messrs. Newton and Berry.

To DAVID SELDEN, *of the borough of Liverpool, in the county palatine of Lancaster, merchant, in consequence of a communication made to him by a foreigner residing abroad, for an invention of a certain improvement or certain improvements in machinery used to give a degree of consistency to, and to wind on to bobbins, barrels, or spools, rovings of cotton and the like fibrous substances.*—[Sealed 26th February, 1831.]

THE improvement in machinery used to give a degree of consistency to, and to wind on to bobbins, barrels, or spools, rovings of cotton and the like fibrous substances, which forms the subject of this Patent, consists in certain mechanism to be connected to or combined with the principal operative parts of the ordinary roving machines, and are designed for the purpose of giving a suitable degree of tightness or compactness to the fibres of the cotton, previous to the rovings being wound upon the bobbins or spools for spinning, which is effected in a different manner to that of the ordinary machine employed for performing such process. The invention applies also to conducting the said rovings to the spools or bobbins, and causing them to be wound thereon with uniformity, which improvements are fully exhibited in the drawings, (see Plate V,) and will appear perfectly evident by the following description thereof:—

Fig. 1, is an elevation of a roving machine, as viewed from the end, in which some parts of the improvements

are shewn; fig. 2, is a horizontal or top view of the same machine; fig. 3, is a vertical section taken through the middle of the machine, and fig. 4, is a partial section taken through the machine near the end, parallel to fig. 3, but in the opposite direction to fig. 3: the similar letters of reference indicating corresponding parts of the machinery in all these four figures.

The carded cotton being placed in cans in front of the roving machine as usual, the filaments are conducted thence through the drawing rollers *a, a, a*, for the purpose of being drawn into rovings; these rovings are then passed between two rubbing surfaces *b, b*, which, by their progressive motion on rollers, carry the rovings forward to the spools or bobbins *c, c, c*, but at the same time by a reciprocating lateral traverse given to these rubbing surfaces, they twist and untwist the filaments as they advance, and deliver them ready to be wound upon the spools in a compact state, but nearly, if not perfectly, in an untwisted roving; the two rubbing surfaces *b, b*, are formed by two endless sheets of leather, or some other suitable material, combining flexibility with firmness of substance and roughness of surface; these endless sheets are distended by rollers *d, d, d, d*, which are mounted on pivots turning in the end pieces *e, e, e, e*, of two sliding carriages; two flat boards, or other suitable material, are fixed in the said carriages at *f, f*, which extend the whole length of each carriage, for the purpose of keeping the two surfaces of the rubbing leathers *b, b*, in close contact as they pass between the boards. The actuating power being applied to the rigger *g*, the shaft *h*, is made to turn, and a pinion upon this shaft gives motion to the drawing rollers as usual in other roving machines; by a connection of gear work the said shaft *h*, actuates the lower toothed cylinder *i*, fixed to the axle of the lower roller *d*, and this taking

into a corresponding toothed cylinder fixed on the axle of the upper roller *d*, these rollers *d*, *d*, are both made to turn simultaneously in opposite directions, conducting the two surfaces of the leather *b*, which are in contact, and also the rovings which are between them towards the back part of the machine. The rovings, on being discharged from between the rubbing surfaces, are passed over a rod and through guides *k*, *k*, *k*, to the spools or bobbins *c*, *c*, *c*, and are laid evenly round the barrels of the spools in uniform coils by traversing the guides, as will be further described hereafter.

In order to give compactness or consistency to the fibres of the rovings delivered from the drawing rollers, the rubbing process is introduced, which is effected by the following means:—At the extremity of the shaft *h*, there is affixed a bevel toothed wheel *l*, taking into a similar wheel *m*, fixed on the top of a vertical shaft mounted at the end of the machine; upon this shaft is fixed a crank arm *n*, which is connected by a link *o*, to a lever on the axle of a reciprocating toothed wheel *p*, and of consequence as the crank *n*, goes round, the wheel *p*, is made to turn to and fro upon its axis. Two racks *q*, *q*, are respectively connected by joints to the upper and lower sliding carriages *e*, *e*, *e*, *e*, and hence the reciprocating movements of the toothed wheel *p*, cause the racks *q*, *q*, to slide the carriages to and fro laterally in opposite directions (guided by the eyes or ears at the ends of the carriages *e*, *e*, sliding upon the fixed rods *j*, *j*,) and thereby producing that rubbing of the rovings between the two surfaces of leather which twists and untwists the filaments of cotton as before mentioned, for the purpose of giving compactness or consistency to the roving previously to its being wound upon the spools or bobbins.

The bobbins *c*, *c*, *c*, are mounted upon small axles as

usual, supported in forked arms fixed upon the longitudinal rods *r*, *r*, which rods are screwed by nuts to the frame work of the machine. The peripheries of the bobbins bear upon the aprons *s*, *s*, *s*, *s*, which aprons are formed by endless belts of leather, extended over the two tension rollers *v*, *v*, and one of these rollers being made to turn by means of pullies and bands from the main shaft *h*, the aprons *s*, *s*, *s*, *s*, are driven, and the bobbins *c*, *c*, *c*, turned round by the friction of their contact with the travelling aprons. It will hence be perceived, that the speed with which the bobbins revolve upon their axles and take up or wind on the rovings, will not be increased by the accumulation of the rovings or enlargement of their diameters, but that as they are turned by the contact of the uniformly travelling apron, their rotation will be at all times equal to the taking up required. The guiding of the rovings on to the spools or bobbins in uniform coils may be effected in several ways: that which is proposed to be employed in connection with this improved machine as a convenient mode of guiding the rovings, consists in attaching the guides or eyes *k*, *k*, *k*, to long rods mounted upon standards, affixed to the sliding carriage *u*, *u*, which carriage has wheels or pullies under it, running upon longitudinal rods *w*, *w*, seen best in fig. 3; a cord extending from a pulley on the shaft *x*, (driven by the bands before described), is passed over a bowl or pulley fixed on a vertical shaft *y*, *y*, as shewn in fig. 4; upon this shaft there is a horizontal wheel *z*, one half of the periphery of which wheel has teeth, the other half is plain. On each side of this wheel there is a small rack fastened to the sliding carriage; and as the wheel goes round, its teeth taking alternately into one or the other of these racks, drives the carriage *u*, to and fro by a slow motion; and the guides *k*, *k*, attached thereto being by these means made to traverse

along in front of the bobbins, the rovings are thereby guided and laid as they wind on to the spools in uniform coils beside each other from end to end of the bobbins.

The Patentee concludes his specification by saying—Lastly, I desire it to be understood, that though I have exhibited in the drawings accompanying this my specification, various parts or portions of machines that have been heretofore well known and in use, I do not intend to claim those pieces of mechanism as new, but I claim the whole of such parts combined as a new combination of mechanism, adapted to give a degree of consistency to, and to wind on to bobbins, barrels, or spools, rovings of cotton, and the like fibrous substances; and I claim in particular the employment of rubbing surfaces for the purpose of giving a compactness or consistency to rovings previously to their being wound on spools or bobbins.—[*Inrolled in the Rolls Chapel Office, August,* 1831.]

Specification drawn by Messrs. Newton and Berry.

To THOMAS GAUNT, *of Chapman Street, Islington, in the county of Middlesex, gentleman, and* GEORGE FREDERICK ECKSTEIN, *of Holborn, in the same county, stove grate manufacturer, for their having found out and invented an improved fire grate.*—[Sealed 14th April, 1831.]

THIS improved fire grate is so constructed that the range of bars containing the ignited fuel, may project into the room where the grate is placed; by which means it will emit into the room a greater degree of heat than the fires of ordinary grates; and over the fire, a hood cap, or segment of a dome is fixed, as a smoke conductor.

Under this hood cap, or segment of a dome, is an aperture for the escape of the smoke from the fire up the

chimney; the range of bars containing the ignited fuel being made to raise up to the hood cap, or segment of a dome, or to fall at pleasure, whereby the rapidity of the combustion of the fuel may be increased or diminished as circumstances or convenience may require, and this means of regulating the draft will very much correct, if not wholly prevent, the annoyance of smokey chimnies. The hood cap, or segment of a dome, will become more or less heated by the ascent of the smoke, and from its upper surface a considerable degree of warmth will be imparted to the room.

Plate VI, fig. 8, exhibits a back view of this improved fire grate; shewing an apparatus by which the range of bars containing the fuel is raised and lowered; fig. 9, is a transverse section taken vertically through the middle, for the purpose of more perfectly exhibiting the improved parts of the fire grate; *a, a, a,* is the back of the grate, to which all the parts are connected; *b,* is the inside back, fixed to the back *a, a, a.*

The bars *c, c, c,* are attached to the standards *d, d,* to which is also fixed an open barred bottom; *e, e,* represent narrow grooves, cut through the back *a, a, a,* extending downwards to the bottom of the standards *d, d,* and each of these standards, by means of small screws and nuts passing through the grooves *e, e,* is fixed to a vertical sliding bar *f, f,* placed edgewise, as shewn in the figures, and sufficiently thin to move up and down in the grooves or nicks *e, e.* Two chains *g, g,* respectively affixed to the lower parts of the vertical or sliding bars *f, f,* are passed over the pullies *h, h,* and a weight *i, i,* is attached to each chain, for the purpose of balancing the range of bars containing the fuel, and the estimated weight of fuel to be at any time used. In the front of the grate there is projecting outwards the square head of an arbor, on which the pinion *l,* seen in fig. 8, is fixed.

This pinion takes into a segment lever rack *m, m, m,* the pivot or fulcrum of which is fixed in the back of the grate *a, a, a,* at *n*; to the reverse end of this lever *m,* a rod *o,* is attached by a joint at *p,* and the lower end of this rod is by a similar joint at *q,* connected to a cross bar *r,* which cross bar is screwed or rivetted to the vertical sliding bars *f, f*; on turning the arbor in the front of the grate by a winch or key, the lever *m, m, m,* will be moved upon its fulcrum pin, and its reverse end be made to raise or lower the bar *r,* which, through the agency of the vertical bars *f, f,* will elevate or depress the range of bars containing the ignited fuel. In figs. 8, and 9, *s, s, s,* is intended to represent a moveable plate, covering a space sufficiently large to permit a chimney sweeper to pass through, in order to sweep the chimney.

The forms and proportions of the several parts of this improved fire grate may of course be varied according to the taste and experience of any manufacturer; and though the Patentees have shewn it under only one form, they do not intend to confine themselves to the particular form shewn in the figures, but they recommend that the hood cap, or segment of a dome, should be made to correspond with the projection of the bars of the grate with which it is connected, and that its outer rim should not extend beyond them.

Lastly, the Patentees state that they desire it to be observed, that they claim as their improvement the adaptation of a hood cap, or segment of a dome, placed over the fire as a conductor of the smoke and draught of air in connection or combination with a grate or range of bars containing the ignited fuel capable of being raised or lowered at pleasure, for the purpose of increasing or diminishing the rapidity of the combustion of the fuel.—[*Inrolled in the Rolls Chapel Office, October,* 1831.]

Specification drawn by Messrs. Newton and Berry.

To JOHN BOWLER, *of Castle Street, Southwark, in the county of Surrey, hat manufacturer, for his having invented certain improvements in machinery employed in the process of dying hats.*—[Sealed 4th November, 1831.]

THE invention specified under the above Patent, consists in dipping or immersing hats to be dyed into the kettle or copper containing the dying liquid by machinery, in such a manner, that the hats are made to enter the dye in different positions, and in different parts of the copper every time they are immersed, whereby the hats will be more evenly dyed, and at the same time preventing the necessity of turning the hats by hand, or removing them from the machine. The apparatus described by the Patentee for effecting these objects, is a skeleton or open frame work of wood or metal, having doors opening in the sides, and cross bars or partitions. On all parts within the frame and on the bars or partitions pegs or pins are fixed, on which the blocks holding the hats to be dyed are placed. This frame may be made of a square form, or any other convenient shape, and capable of containing as many hats as necessary; it is also made to revolve upon an axis passing through the centre, and is suspended in and over the copper from the ends of this axle by means of straps of metal, connected by a cross bar forming a handle, on which the whole is suspended from a pulley block, used for raising or lowering the frame in the kettle.

The Patentee recommends using three pins to each hat block, for the purpose of preventing the block turning round thereon; and also to prevent the block, which is usually formed of three parts, falling to pieces as one of the pins enter into corresponding holes, in each of the three parts of which the block is composed, and thus

keep the block together, which is necessary, in consequence of the pliable and weak state of the hat at the time it is saturated with the dying liquid; and when once the hats are blocked, and placed in the frame, they do not require afterwards to be touched until the dying process is finished.

The cross frames or partitions are capable of being moved nearer to, or further from each other, when smaller or larger hats are to be dyed, so that when small hats are to be dyed, a greater number of partitions may be used. The pins of the partitions having been filled with hats, those on the inside of the frame and doors are next to be filled, the doors closed, and the machine lowered into the dye copper, until the whole is immersed in the liquid.

It is well known to those persons engaged in dying hats, that it is necessary to dip or immerse the hats many times into the dying liquid for a certain time, during the process, and then submit them to the action of the atmosphere; and the time requisite they should be immersed in the dying liquid, and the time required for submitting them to the action of the atmosphere, varying according to the nature or quality of the hat, and also the strength or quality of the dying liquid. When the frame and hats have been immersed a sufficient time in the liquid, and require to be submitted to the atmosphere, the frame is to be raised out of the copper, and the hats allowed to drain in the position they entered and left the liquid; and when they are again to be immersed, the frame is to be reversed, which is done by turning it on its axle, *half* a revolution or up side down, and in this position is to be again immersed in the copper, by which means those hats which were before in the upper part of the kettle, will now be at the bottom, and *vice versa*. When it has been a suffi-

cient time immersed, it is again to be raised out of the copper, and the hats to be drained in the position they *are in* until it is necessary again to dip them, when the frame is to be turned *one quarter* round, and the whole again immersed in the dying liquid for the necessary time, when it is to be raised and turned upon its axis, *half-round* as after the first dipping, which will bring the side last introduced into the liquid up to the top; and this process is to be successively continued until the hats contained in the frame are sufficiently dyed, when they are to be removed, and the machine again filled.

It will be evident from the above description, that the hats contained in the frame will enter into the dye copper in a different position, and a different part of the copper at each lowering of the frame into the copper, whereby an evenness of dye is obtained in the hats.—[*Inrolled in the Inrolment Office, May,* 1831.]

To JOHN GEORGE LACY, *of Camomile Street, in the city of London, gun manufacturer, and* SAMSON DAVIS, *of East Smithfield, in the county of Middlesex, gun lock maker, for their having invented a certain improvement or improvements in the construction of guns, and fire arms.*—[Sealed 6th December, 1830.]

THE improvements described by the Inventors in their specification of the above Patent, are the application of a bent lever to locks for all kinds of guns and fire arms, instead of the tumbler used in locks of the ordinary construction; this bent lever has the notches or stops formed on it, at one end, for retaining the hammer of the lock in the positions of half and full cock; the other end being acted upon by the sear of the trigger.

Plate V. fig. 12, is a view of one of the modes of adapting this invention to a percussion gun lock, with the hammer shewn at rest, or after the gun has been discharged; *a, a,* is a bent spring hammer or striker, which supersedes the necessity of the main spring; *b,* is the head or part which strikes on the nipple; and *c,* is the tooth which takes into the notches on the bent lever when at half or full cock; the other end of this spring hammer is fixed into the lock plate *d, d,* in a similar way to the main spring of a common lock; *e, e,* is the bent lever, with the notch or stop 1, for retaining the hammer at half cock; and 2, the stop for the hammer at full cock, as shewn by the dotted lines in fig. 12; the other end of this bent lever is acted upon by the sear *f,* of the trigger; *g,* is a spring, acting instead of the sear spring of the ordinary lock, which keeps the end of the bent lever in contact with the tooth *c,* in the head of the hammer, when the finger is taken from off the trigger.

It will be perceived that in cocking the gun, the tooth *c,* will first take into the notch 1, for the half cock; and then into the other notch 2, for the full cock, and on pulling the trigger, the end of the sear *h,* will be raised; the other end *f,* will be depressed, which will cause the end of the bent lever to be depressed also, and the other end to be moved away from the head of the hammer, which will then be free to spring back upon the nipple, and discharge the gun.

Fig. 13, is a view of another mode of adapting this bent lever to a gun lock, with the hammer or striker shewn in the position of full cock; *a,* is the hammer or striker, as in ordinary percussion locks, having a main spring *b,* shewn by dots connected to it by a bridle *c,* also shewn by dots, as in the ordinary way; *d, d,* is the bent lever,

with the notches 1, and 2, for retaining the hammer; and *e*, is the sear of the trigger. It is obvious, that the same effect will be produced on cocking and letting off the gun, as in that described under fig. 12.

The Patentees state, after describing the above two modes of carrying their invention into effect, that they do not mean or intend to confine themselves to the employment of these two methods only; but claim as their invention, every other mode by which it can be carried into effect, and particularly the use of the bent lever, in any way it can be applied to fire arms generally.—[*Inrolled in the Inrolment Office, June,* 1831.]

To WILLIAM ALLTOFT SUMMERS, *of St. George's Place, St. George's in the East, in the county of Middlesex, engineer, and* NATHANIEL OGLE, *of Millbrook, in the county of Hants, Esquire, for their having invented certain improvements in the construction of steam engines and other boilers, or generators applicable to propelling vessels, locomotive carriages, and other purposes.*—[Sealed 13th April, 1830.]

THE steam boiler, or generator described by the Inventors in their specification of the above Patent, and claimed by them as their invention, consists in forming the boiler of a number of tubes or cylindrical chambers, placed in a vertical position, having other smaller tubes or flues passing through them, for the passage of the hot air or ignited gas from the furnace below; the larger tubes or chambers contain the water to be heated, and are connected together at both ends by horizontal tubes

or pipes. The supply of water is forced into the vertical chambers by a force pump through the horizontal tubes at the bottom; and from the upper horizontal tubes, the steam is passed by a pipe off to the engine.

The inner tubes or flues form a complete passage for the heated air, from the furnace crosswise through horizontal tubes, and throughout the larger cylindrical chambers from end to end; the whole apparatus is surrounded by a casing of metal, by which the heated air is also made to pass up through the spaces between the outsides of the larger cylindrical chamber; whereby the water contained in them is exposed to a very much extended surface of heated metal, on both the insides and outsides of the cylindrical chambers.

The Patentees state, that they do not limit their claim of invention to any precise form, as the tubes or vessels may be elliptical, or of any other convenient form, which would answer the purpose; but they claim as their invention, the placing of an inner flue or tube for the escape of the heated air or gas, arising from the fire inside a larger tube or vessel in a perpendicular position; the said inner flues running through the inside of the larger tube or vessel, and out at the top, the larger vessel being also placed in a perpendicular position.—*Inrolled in the Inrolment Office, September,* 1830.

NOTICE OF NEW BOOKS, &c.

Campaigns & Cruises in Venezuela & New Grenada, and in the Pacific Ocean, from 1817, *to* 1830.—A great mass of information, description, military narrative, and anecdote, is here collected, and that in a very pleasant and useful manner. South America is still novel ground to the traveller; and the scenes of which it has been and is the theatre, are marked with all the wild and adventurous spirit which characterises those convulsions with which barbarism has ever emerged into civilization. Thirteen years have given the author ample material; and this is just one of those works to suit the general reader and searcher after knowledge.

The Life of Major-general Sir T. Munro, Bart. &c. By the Rev. G. R. Gleig. New edition.—This is an excellent edition of an excellent and standard work; it originally appeared in three 8vo. volumes. This, with some interesting additions, is comprehended in two.

Pompeiana. By Sir William Gell. Part XI.—The present part of this curious and interesting work contains double the quantity of plates and letter-press to be found in the preceding parts, as will also appear in the twelfth and last part, which will be published in about two months.

Captain Beechey's Narrative of a Voyage to the Pacific and Beerhing's Straits.—A new edition, replete with interest and information of every kind, of a work long since estimated according to its rich desert by a discerning public, and we are happy to notice this new and convenient edition of Captain B.'s work. If the larger paper copy occupies a place in every good library of a high order, we are sure this cheaper publication, with the same beautiful and characteristic engravings, and the same valuable text, will spread yet more widely the fame of the author.

Polytechnic Library. No. I. The Art of Glass-blowing. By a French artist.—Chemists or experimentalists, who may desire to become so far independent of instrument makers, as to be able to blow their own apparatus, will find instructions in the art in this small volume.

Rollin's Ancient History. Part I.—This is the commencement of a cheap reprint of Rollin's *Ancient History.* All that is stated of the plan is, that it is to be completed in twenty-one monthly parts. We certainly think well of the design, for this author can never be too widely diffused, or too much read.

LITERARY AND SCIENTIFIC MISCELLANY.

Change of climate; diminution of temperature on the surface of the earth.—It is not only from analogy, observes Mr. Lyell in his new work on geology, that we must infer a diminution of temperature in the climate of Europe; there are proofs of this doctrine in the only countries hitherto studied by geologists, in which we might expect to find direct proofs. It is not in England, or in the north of France, but on the borders of the Mediterranean, from the south of Spain to Calabria, and in the islands of the same sea, that we must look for conclusive demonstrations of this fact; for it is not only in beds whose fossil, shells are like the shells of living species, that a theory of climate can be subjected to a kind of *experimentum crucis.* In Sicily, at Ischia and in Calabria, where fossil shells of the most recent beds belong almost entirely to kinds which are known to be still inhabitants of the Mediterranean. The conchologist remarks that individuals deposited in the interior of the earth, surpass, in medium and size, their living types. It cannot however be doubted, notwithstanding such a difference in dimensions, that the species are identical, since the living individuals, sometimes, though rarely, attain to the size of the fossil; and the preservation of the latter is so perfect that they still retain their colour, which furnishes another means of comparison.

In leaving the sea and advancing into regions less disturbed by modern volcanos, there are found in the Sub-Appenine hills some species still living in the Mediterranean, mingled with multitudes of other kinds now extinct, and which present indubitable indications of a warmer climate. Several kinds are common to the Sub-Appenine hills, the Mediterranean, and the Indian Ocean. The fossils cor-

respond in size with their fellows within the tropics, while the individuals of the same species now in the Mediterranean, are small, degenerated and stunted, by the absence of those conditions which they still enjoy in the Indian seas.

No observations of a contrary nature have occurred to neutralize our conclusions, neither are there found associated in these groups, individuals appertaining to species confined within the arctic regions. On the contrary, when we can identify these fossil shells with living species foreign to the Mediterranean, it is not in the icy sea, but between the tropics that we must look for them.

Mr. Lyell has carefully examined several hundred species of shells obtained in Sicily at the height of one thousand feet, among which is a great number of kinds still living in the Mediterranean; the difference of size being very striking in the greater number of these two classes.

Some interesting observations, formerly made by Pèron and Lesueur, stated in the Annales du Museum, T. XV. p. 287, and which Mr. Lyell has not cited, confirm his opinion that the greater size of individual shells of the same species is an indication of a change of climate. These naturalists have remarked that every species of marine animals has received a distant location, confined to certain parts of the ocean, and that in those positions they are found to be larger, and more beautiful. In proportion as they are removed from this locality, they degenerate, and are at length extinct.

The *Haliotes gigantea,* for example, which in Van Dieman's land, attains the length of fifteen to twenty centimetres, suffers in its dimensions at Maria Island, is still more degraded at the Island of Decres and Josephine, is only a miserable abortion on the rocks of Nuytland, and is no longer visible at port King George. The same thing is observable in the *Phasianellus ;* their proper habitation is at Maria Island, where vessels are loaded with them ; and after suffering insensible degradations they are lost at port King George. It is interesting to witness the same phenomena exhibited in a horizontal direction on the present surface of the earth, appearing again in a vertical direction upon the different surfaces, which, at successive periods, have limited the exterior configurations of the terrestrial globe.—*Bib. Univ.*

Bone Caves in New Holland.—A collection of fossil bones has been sent to Professor Jameson, from New Holland, taken from a cave or caves in Wellington Valley, about 210 miles west from Sidney. They are found embedded in a red ochreous cement which occurs partially in crevices of the limestone rock, in different parts of South Wales. The limestone rests on granite, and generally near or under trap rock. The bones are found in a broken state, as in caves of a similar character in Europe, and like them they are of animals of very different kinds and sizes.

It appears from the description, by Major Imrie, of the red ochreous cement, containing bones which occur at Gibraltar, and along the northern shore of the Mediterranean, that this breccia is of the same kind, both *in situ*, and character, and that its antiquity is at least equal to, if not much higher, than that of the bones found under stalagnite, in caves in different parts of Europe.

Interesting discovery of Fossil Animals.—There has been lately sent to the Garden of Plants, a collection of fossil bones, from the Lacustrine deposits of Argenton, (Indri,) consisting of five or six species of Lophiodon, from the size of a large rabbit, to that of a horse; also species of the genus Anthrocotherium, of the Trionyx and Crocodile. Some recent discoveries in the diluvian ossiferous deposits of Chiveley, (Loiret,) of the bones of the extremities of the animal called Gigantic Tapir, by Cuvier, shews that this animal, by the test of its osteology, is closely allied to the living Tapir, although equalling, if not exceeding the Rhinoceros. The Indri and Loiret are two departments in the central districts of France.—*Edin. Phil. Jour.*

Crystals in Living Vegetables.—Various naturalists have taken notice of the appearance of crystals in the internal parts of vegetable tissues, but nothing very explicit and certain has been stated respecting them. M. Turpen has discovered, in the cellular tissue of an old trunk of the Cereus Peruvianus, in the Garden of Plants of Paris, where it has been growing one hundred and thirty years, an immense quantity of agglomerations of oxalate of lime. They are found in the cellular tissue of the pith and bark. They are white, transparent, foursided prisms, with pyramidal terminations, collected in radiant groups.

Platina Lamp.—In a communication from George Merryweather, Esq. to Professor Jameson, dated Edinburgh March 5th, 1831, it is proposed to extend the aphlogistic platina lamp, by constructing the body of the lamp of tin, large enough to contain a quart or more of alcohol. This will be sufficient to keep the platina in a state of constant ignition for thirteen or fourteen days and nights. Such a lamp, while it is entirely devoid of glare, affords sufficient light to shew the face of a watch in the dark of night. It is best managed by inserting a little spongy platina into a small cage of platina wire. The top of the lamp wick should be spread out a little, in the form of a coronet, and the wire cage pricked into it, so as to be nearly, but not quite, in contact with it. The bottom of the lamp should be concave so that the wick may take up all the alcohol, and if it be connected with an unfailing reservoir of alcohol, the lamp may be kept ignited for years. The spongy platina does not appear to be in the least deteriorated by being kept in a state of constant ignition.

To prevent the access of dust, &c. the lamp is covered with a glass, shaped like an inverted funnel, resting upon a ring or cylinder of tin having holes around it to admit a current of air. If a light is required, the glass cover is to be elevated and the platina gently touched with a match of chlorate of potash, which will be instantly inflamed.

Should the lamp diffuse an unpleasant odour in the room, a condensing shade or cover may be applied to it, formed of tin. This cover is conveniently made of a conical shape. The base of the cone is to be convex inward, like the bottom of a common glass bottle. From the centre of this concave bottom (concave externally) a tube proceeds downwards, of sufficient length and diameter to admit the neck of the glass funnel which covers the lamp. The vapours that rise up through the funnel into the conical condenser, and fall to the bottom of it in a liquid state, may be drawn off through a stop cock soldered to the edge of the cone. This cone may be suspended by a ring to a nail in the wall, and brought over the glass funnel when required.

The author finds that equal parts of alcohol and whiskey answer quite as well as pure alcohol, or he says, one third of alcohol and two thirds of whiskey do very well. This lamp may prove very useful in mining districts, as a con-

stant light that may be depended upon, if the reservoir is periodically replenished.—*Edin. Phil Jour.*

Thunder Storms in France.—The Count de Triston has made observations on the direction of the thunder storms which have devastated the department of the Lorich for the last sixteen years. The following general inferences have been made by him respecting the progress and intensity of thunder storms in plain countries, intersected by shallow valleys. Thunder storms are attracted by forests. When one arrives at a forest, if it be obliquely, it glides along it; if directly, or if the forest be narrow, it is turned from its direction; if the forest be broad, the tempest may be totally arrested. Whenever a forest, being in the path of a thunder storm, tends to turn it aside, the velocity of the storm seems retarded, and its intensity is augmented. A thunder cloud which is arrested by a forest, exhausts itself along it, or, if it pass over, is greatly weakened. When a large river or valley is nearly parallel to the course of a thunder storm, the latter follows its direction; but the approach of a wood, or the somewhat abrupt turn of the river or valley makes it pass of. A thunder cloud attracts another which is at no great distance, and causes it to deviate from its course. There is reason to believe that the action is reciprocal. A cloud attracted by a larger, accelerates its motion as it approaches the principal cloud. When there is an affluent cloud which was committing ravages, it sometimes suspends them on approaching the principal mass, which is perhaps a consequence of the acceleration of its course; but after the union, the evil generally increases. Twenty-one thunder storms, whose course has been distinctly traced, have extended from N. N. W. to S. S. W. No destructive thunder storms have come from any other points of the horizon. Lastly, the position and form of the forest of Orleans, Blois, &c. satisfactorily accounts for the frequency of hail storms in certain communes, and their rare occurrence in others.

Round Sterns to Ships of War.—The important question of round sterns has with much generality been discussed; and it is therefore with no ordinary pleasure that we find a splendid prize has been offered by the French Minister of Marine, for determining among all the forms that can be presented that particular one, which

shall unite in the highest degree all the requisite conditions that the seaman, the naval architect, and the geometrician may require.

Our readers are aware that a vigorous contest was for a long time kept up respecting the *principle* of the round sterns; but time, which softens differences, and moulds even prejudice itself into the form of truth, has in this case obtained another victory; and a figure which our gallant seamen had connected with the glorious recollections of Trafalgar and the Nile, is now—with wisdom which cannot be too highly praised—nearly if not altogether abandoned. The square stern, with all its massy and cumbrous forms, has indeed given way to another, more in unison with the great march of improvement now going on.

But while the principle of what is commonly called the round stern has with few exceptions been admitted in all its fulness, its best possible form has not been determined; and it would seem as if fancy, rather than the sound discretion which geometry imparts, had presided over the designs hitherto submitted to the world.

Among the infinite variety of forms which may be denominated "*round,*" there must be one which shall unite in a higher degree than any other, all the best conditions of strength, convenience and defence;—which shall secure to the brave sailor the greatest degree of comfort, add a new arm to his power in the day of battle, and secure to that portion of the frame-work of the vessel, the same admirable strength as distinguishes its other parts. It is this choice of forms, which the French minister of marine now invites the naval architect, the sailor, and the man of science to contemplate; and we hail the call as a revival of the days when the great men of the Academy of Sciences, clad in the armour of the transcendental geometry, descended from the lofty elevation of the system of the world, to contend for the conditions of the metacentre, the great principles of stowage, the problems of masting, of pitching and of rolling, and all the other complicated but interesting inquiries, which the general question of ship-building involves.

Our *Journal*, read alike by geometricians, the naval architects and the sailor, can hardly be better employed than in recording the conditions which the French minister has proposed for this great problem.

"To furnish the best plans for the circular sterns for line of battle ships and frigates, with all the exterior and interior fittings, the manner of disposing the timbering so as to combine the necessary conditions for defence, with strength, lightness, a dispersion of the weight in proper proportion to the displacement of each part, the efficiency of the rudder, the convenience of the water-closets, and the general suitableness of the accommodations.

"This manner of fitting the stern must possess facilities for enabling the commandant to be aware of whatever manœuvres may be in progress, without being obliged to appear on deck.

"The style of ornament which it would be proper to adopt, as well for the forward as for the after part of these new constructions, is also to be described. The competitors are to remember that nothing of importance is to be at all sacrificed to these decorations.

"The side of the ship at the stern must have the same thickness as at the corresponding places in other parts of the ship. The ports must be so disposed, that it may be easy, on each deck, to bring guns to bear right aft and on the angles of the quarters, to command those points which the other guns cannot be brought to bear upon.

"The rudder may be fitted either without board, or within with a circular head, but reasons must be given for whatever plan may be proposed. Reasons also are to be stated for the station which may be proposed for the water-closets, whether they are fitted interiorly, or in an exterior gallery.

"The officers of the different branches of the naval service are called upon to send their proposals to the minister before the 1st of July 1832. *Other persons wishing to become competitors, are eligible to do so.**

"The memoir in which each competitor explains his proposals, must be accompanied with all the calculations and drawings which may be necessary to render his plan perfectly complete and intelligible in all its details.

"Each proposal must have a motto affixed to it, of which a copy is to be enclosed in a sealed letter, containing also the name and place of residence of the proposer.

"A medal of the value of 2000 francs will be given to the author of the best memoir presented to the minister of marine before the stated period."—*Brewster's Jour.*

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* The field is therefore open to our countrymen.—Ed.

On the scarcity of Books.—The scarcity of a book, which has nothing else to recommend it, is a fact which is hardly worth knowing; but when the work has any real value, either from intrinsic merit, or from forming a link in the history of science, its scarceness then becomes an object of importance. It is constantly found that errors are perpetuated by writers who satisfy themselves by copying what they find at second hand, and these errors can never be corrected without reference to original authorities. It is useful, therefore, to know not only what books are scarce, but also (when it is possible) where they are to be found. It must often occur to those who have access to large libraries, that they meet with works which they had never before heard of; and the books so discovered will sometimes contain matter which had been looked for in vain. Neither is it to be attributed to a mere selfish anxiety for accumulation, when any one employs himself in collecting with this view. Much is learned from what is in our own possession, and even in the search for it; and every one who has indulged himself in collecting books, must have often found advantage from what, at the time of the purchase, he did not foresee that he should derive any particular use. This of course supposes that he has collected with some discrimination; and if in that case he should sometimes be induced to give a higher price than he otherwise would for a book in consequence of its scarcity, he is not on that account alone to be blamed.—*Brewster's Journ.*

Account of the Aurora Borealis seen in Roxburghshire on the 5th of October 1830. By Mr. W. Laidlaw.—On Friday evening, the 17th September, an uncommon form of the aurora borealis was observed all over the country. It was in the shape of a luminous white arch, and stretched from W. by S. to E. by N. nearly ending on the E. in a pencil-formed point, and was accompanied by pale streamers in the north horizon, and continued visible from twenty to thirty minutes.

This evening, (October 5,) I was called to observe an appearance that seemed at first to be nearly similar, though it was more bright and better defined. When first seen it passed exactly over head, and in a direction perhaps nearly the same as the former; it was very bright, and

white on the N. edge, and better defined than on the S. on which side it in some parts shaded off into the sky. On the west end it sunk bright below the horizon, but on the east, where it approached the moon, it ended like the former in a tail or brush-shaped point, before it reached the horizon—perhaps about 20° above it.

Having no instrument to measure the breadth, I compared it with the distances of some stars, and found it equal to the longest diagonal of the square of the Great Bear—wider in the E. and narrower in the W. After looking at it occasionally for about twenty minutes, I began to be aware that the arch was making a progress towards the south, and had already gone over a space equal to its own breadth. I remarked likewise, that its extremities were comparatively stationary; or that it revolved on its horizontal diameter, and at thirty minutes after eight, the arch through which it moved was, as near as I could judge by the eye, equal to three times its breadth. I now regretted still more the want of an instrument to measure angles; for, while lying on my back to observe the curvature, I noticed that the bearing of the extremities was not due E. and W; but that a line from the Pole star formed an acute angle with the eastern half, and I began to suspect that the centre of the arch might be the magnetic pole. At this time the brightness began to fade, and a longitudinal fissure appeared in the E. quarter. At nine o'clock, the whole arch had become broader and considerably less bright; and in a short time after it very suddenly broke up into fragments, which I soon observed had a motion, following one another in the line of the arch from E. to W. My attention was now strongly directed to this movement, which I never before noticed in any of these arches.

The appearance which this now assumed was very interesting, Whether it was owing to the moon being in that part of the heavens that directed my attention to the E. I am uncertain; but I first observed that in the eastern part the separated portions or nebulæ had assumed a striated or rather crinited appearance, the lines of each individual nebula pointing S. E. even while they moved all westward, following one another in an order parallel as to each other, but obliquely as to their position on the arch, so that to

a careless observer the first general form of the arch would have seemed to be preserved; only that at, and on a little on each side of the meridian, the general continuous line of the arch was interrupted; and here an interesting change took place in the direction of the striæ of the nebulæ, or rather in the order in which they appeared when farther E; for, on crossing the meridian, they veered to the right, and formed on the western part of the arch, with the striated appearance pointing S. W. During the time that this movement continued, coruscations were apparent, and sudden alternate disappearances and re-appearances of the brightness, similar to what is often observed in the common streamers; the striated divisions not being always, nor throughout the whole length of the arch, distinctly separated from each other. These coruscations were most apparent in the eastern quarter, although they sometimes flashed from one end of the arch to the other, and always from east to west.

The motions of the striated divisions had the apparent velocity of clouds in a gale of wind, but the shifting and flashing was similar to that of the streamers usually seen in the north. I have since learned from two different persons, one in this neighbourhood and the other in Liddesdale, that there were two arches that evening, one a little after sun-set, which was not so bright and soon disappeared; and that the second flashed out at once bright into the sky.

It has since occurred to me that the motion of the striated portions of the arch from E. to W. and which seemed so singular, would be best described by referring it to the motion of a wheel with radiated teeth. The motion of such seen in perspective, would exactly represent the extraordinary appearance attempted to be described.—*Brewster's Journal.*

A new metal discovered.—M. Dulong read, on the 7th of February last, to the French Institute, a letter from Berzelius, which announces the discovery of a new simple substance by Mr. Sestrom, director of the mines of Fahlun in Dalecarlia. Mr. Sestrom being engaged in examining an iron, remarkable for its softness, discovered in it a substance, which appeared to him to be new, but in such small quantity, that he could not determine with accuracy all its properties. Afterwards, however, he found it more

abundantly in the scoriæ of the iron, and was thus enabled to prove that the substance in question was a new metal, to which he gave the name of *Vanadium,* after an ancient Scandinavian deity. We have had communicated to us the following additional notice:—Humboldt presented to the Institute specimens of vanadium, the new metal recently discovered in the iron of Esterholm by Mr. Sestrom, and which also exists in Mexico, in a brown ore of lead of Zimapan. M. Del Rio, Professor in the school of Mines, of Mexico, had extracted from that ore a substance, which, to his apprehension, resembled a new metal, to which he gave the name of *Erythronium.* M. Collet Descotils, to whom he sent a specimen, could not admit that erythronium is a single substance, and believed he had demonstrated that it was an impure chrome. It would appear that Prof. Del Rio agreed in this opinion, and there was no longer any idea of its being a new metal. But since the discovery of Sestrom was known to Voller, he, struck with the resemblances which exist between the properties of Vanadium and that which the Mexican chemist attributes to his erythronium, has repeated the analysis of the brown ore of lead of Zimapan, and from which he has obtained a simple body perfectly identical with that of the iron ore of d'Esterholm. It is worthy of remark that so rare a metal should have been discovered in two places so far asunder as Scandinavia and Mexico.—*Edin. Phil. Jour.*

Antique Medals found near Geneva.—In November last, Dr. Dufresne, in digging at his country seat near Chêne, found about one hundred Roman coins, in bronze, most of which are in perfect preservation. They are nearly all of the Emperors Constantine the Great, Constantine II. Constans, Constant II. Magnentius, Decentius, Valentinian I. One large piece, however, is of Antoninus Pius, and there are two of Marcus Aurelius, in admirable preservation, and a small number of coins of Galliënus and Claude le Gothie. This discovery is remarkable, inasmuch as coins of the Constantine family are very rarely found in this country, all those discovered for many years past being of an anterior date.—*Bib. Univ.*

The New Volcanic Island.—The last accounts of this island contained in the *Semaphore,* state that the eruption has ceased, and that the crater is now filled with boiling water, from which a sul-

phurous smoke continues to issue. The isle is chiefly formed of a spongy lava and puzzolane. The brink of the crater is thirty feet in height at the lowest part, in other places eighty feet, and in the centre two hundred feet. It is easy to land on the southernmost side. Smoke issues from several points of the sea around.

Literary Fund. The late Mr. Strahan.—During his life time this philanthrophic and benevolent individual presented a thousand pounds to the Literary Fund; not content with which most liberal donation, he has by his will bequeathed another donation of a thousand pounds to the same institution. This is to be free of the legacy duty, and does honour to the memory of Mr. Strahan, who, well acquainted with the distribution of this charity, knew that he could not leave a blessing where it would be better bestowed.

Tribute to the Memory of George III.—The committee nominated to carry this design into effect, have decided upon an equestrian statue in bronze, of our revered monarch. It is to be executed by Mr. Matthew Wyatt, the original projector of this grateful monument, and whose models of horses for it attracted so much just admiration. A desirable situation in the metropolis will be procured for this work of art, and we trust as fine as it is likely to be a lasting monument will be produced.

Periodicals. The Press.—A journal in Turkish and French is about to be published at Constantinople. M. Blacque, the editor of the *Courier of Smyrna*, is, it is said, to conduct the French portion, while the Turkish part is assigned to Esad Effendi, the historiographer of the empire.

Machine for saving Lives at Sea.—A Mr. Canning has invented a very simple but a very effectual apparatus for saving lives at sea from wrecks, &c. It consists of spars, booms, or any similar materials, always to be found on board of vessels, fastened together with ropes, and made additionally buoyant by the means of barrels.

APPENDIX

To the Report of the Select Committee of the House of Commons, on Patents.

Papers delivered in by John Farey, Esq.

[British Law of Patents for Inventions.]
(Continued from page 45.)

LORD Chancellor Eldon: " This injunction was granted on the grounds whereon this Court has always proceeded, when the public have permitted a reasonably long and undisputed possession of an exclusive right, under colour of a patent: for it is then thought that there is less inconvenience in granting the injunction, until the legal question can be tried, than in dissolving it, at the hazard that the patent may, in the result, prove valid; and unless the injunction were granted, any person might violate the patent, and the consequence would be, that the patentee might be ruined by litigation. The present defendant had entered into an agreement for a licence to work under the patent, but that is not binding if the patent is bad, because plaintiff could not legally grant that licence, and there is no consideration. As this patentee has had possession against all the world, I should act against both principle and practice if I were to dissolve the injunction before the validity of the patent is tried; that would be not only enabling the defendant to exercise a right against law, but would be also encouraging others to take the same liberty. There might be such strong doubt whether the specification was not bad in law, that the Court would put an end to the injunction, although possession of the right might be distinctly proved. I think it is difficult to support this specification. The right under the present patent will subsist until 1808, but the original machine became open to the public in 1801. Great industry appears to have been often exerted by patentees, in the invention of some improvements, annexing them to the subject of the patent, and endeavouring to cover that, as well as the use of the improvements, during a longer period than the law allows. If the improvements give an additional value to the old machine, the public may prefer the improved machine, paying for the improvements to the old machine, without them; but the choice ought always to be left open. The second patent, of 1794, recites the patent of 1787 for the former machine, and states the invention to consist in improvements thereon; but from reading the present specification no one could collect the fact that there were two patents, one for the original machine, and

another for the improvement. I doubt whether it must not appear in the specification for improvements, what are the improvements, exhibiting them so as to show that it is for them alone that the patent is granted, and not having a tendency to mislead. 'The question is, whether a patent for a machine having been duly specified, and a subsequent patent being granted for improvements, it is allowable to represent in the specification, that the latter patent was granted not for the improvements, but for the machine, carrying forwards that idea, and describing the new invention as one entire machine, not as improvements contradistinguished from the original machine.' I feel very considerable doubt; but there has been possession sufficient under this patent to make it fit to be tried, but it must be done speedily. It may be put in the shape of a case, as a question of law."

On the 28th April 1809, this case was argued in the Court of King's Bench, and the following opinions given, respecting the specification.

Lord Ellenborough: "The difficulty is, whether this mode of making a specification is not calculated to mislead, and induce people to suppose that the term for which the new patent is granted, may preclude the use of all parts of the improved machine, for they can only tell by comparison with some other patents, what are the new, and what are the old parts of the invention. If this can be done with reference to one, why not by reference to many old patents, so as to render the investigation very complicated? It may not be necessary, in stating a specification of an improvement, to state all the former known parts of the machine, but it may be sufficient to refer generally to them. As in the instance of a common watch, a patentee might say, take a common watch, and add or alter such and such parts." When Lord Mansfield said, that "the meaning of the specification was, that others might be taught to do the thing for which the patent was granted," it must be understood to mean persons of reasonably competent skill in such matters.

It was argued, that, if there were a succession of patents, for several improvements, ending at different periods, it might be extremely difficult to collect, from specifications like the present, at what periods the successive inventions would come to the public. Mr. Justice Le Blanc said, "Suppose the specification had merely described the improvements and additional parts, must not reference still have been made to the former specification, in order to understand truly how to adapt those new parts to the old machine." Mr. Justice Bayley said, "The second specification being as it is, suppose the former specification to be lost, how is the public to know from the second, what parts of the whole improved machine they may use?" To the latter, the patentee's counsel (Mr. Hol-

royd) answered, that the patentee cannot be made answerable for such loss; but even in that case the public would be benefited by the present mode of specifying, because the knowledge of the whole improved machine would be preserved, which would otherwise be lost, if he had merely described the improvement by itself.

Lord Ellenborough: "I feel impressed by the observation of my brother Le Blanc, that the trouble and labour of referring to, and comparing the former specification with the second, would be fully as great, if the patentee had therein only described the precise improvements upon the former machine. Reference must often be necessarily made, in these cases, to matters of general science; or the reader must carry with him a reasonable knowledge of the subject matter, in order clearly to comphehend specifications of this nature, though intended to be fairly made."

The Court certified to the Lord Chancellor that the specification was sufficient. Liardet v. Johnson.

Watson against Pears. An Action for Infringement of Watson's Patent, dated 10th May 1808, for Improvements in Soap-making. Tried in the King's Bench, 6th December 1809, before Lord Ellenborough. Verdict for the Defendant. In this case it was objected, that the Specification was not enrolled till the 10th of June 1808. The Judge decided, that the day on which a Patent is dated, is not to be reckoned in the time allowed by the Patent for enrolling the Specification.

The Statute of Enrolments (27 Hen. VIII. c. 16,) enacts, that enrolments shall be made within six months next after the date of the deed. In a case Thomas v. Popham, an indenture, bearing date 9th October 1557, was enrolled in the Chancery 21st March 1558, which was the last day of the six months, reckoning 28 days to a month, and not reckoning the day of the date. This was held to be well enrolled. In reply it was objected, that the grantor in that case was a subject, but that grants by the King are liable to a different rule of construction.

Lord Ellenborough: "It used to be held, that the words, 'from the date,' includes that day, in the computation of time; that the words, 'from the day of the date,' excludes that day. Where the time is to be from any act done, the day on which that act is done, is to be included in the reckoning. These formal distinctions have heen done away, and the rule of good sense established, that the words shall be construed according to the meaning of the parties who use them. The case cited is in point, and shows that the day on which the patent bears date, is not to be reckoned. Therefore the month allowed in Watson's patent only began on the 11th of May, and included the 10th of June, on which day the specification was inrolled." A verdict was given against the patentee on other grounds.

Note.—This decision is frequently of importance to the patentees of valuable and complicated inventions, which are very difficult to organize sufficiently within the time allowed for specifying, to be able to describe them in a proper manner, so as to support the patent; an additional day will often make the difference between being obliged to specify from speculation, or from the result of an experiment. Davies, p. 325.

Bainbridge against Wigley. An action for Infringement of Bainbridge's Patent of 1807, for Improvements on the Flageolet, or English Flute. Tried in the King's Bench, December 1810, before Lord Ellenborough. A juror was withdrawn, and each party paid their own costs, the Plaintiff undertaking to bring no new action.

The specification stated, that by the improvement, the instrument produced notes not before produced on the old instrument; it appeared from the evidence that it was a great improvement, but only one new note was produced. Lord Ellenborough held, that this would be fatal to the patent, the consideration on which it was granted not being truly stated. The patentee stated, that by his improvement he had given new notes, when in fact he had given but one new note.

Dyer ex-parte in Chancery; on a petition respecting an application for a Patent, in 1812, which had been commenced previously to another application for the same object, but owing to circumstances, the progress of the first application had been delayed, and the second was in advance, so as to be likely to be sealed first.

Lord Chancellor Eldon held, that in concurrent applications for a patent for the same object, that which obtains the great seal first, will have the sole right at law. "I can see no other mode of deciding, than by awarding the patent to him who runs the quickest through the process."

Fox ex-parte in Chancery. An application for sealing a Patent, for certain Improvements in Steam Engines, notwithstanding a caveat which had been entered by another Patentee, who alleged that the plan was borrowed from his Patent. Heard before Lord Eldon, 9th December 1812. Patent granted.

An affidavit was made by an engineer, that the two inventions were quite different from each other. Lord Chancellor Eldon observed, "A man may, if he chooses, annex to his specification a picture or model descriptive of the invention; but his specification must be in itself sufficient, or it will be bad." If the petitioners have invented improvements upon an engine, for which a patent has been granted, and those improvements cannot be used without the original engine, the petitioners could, after the expiration of that patent, make use of a patent for their improvements, though they would have no right to make use of the other's substratum

before their patent for it expired; after that time the public will have a choice between the patents."

"This is a very difficult subject; but I think I am not justified in withholding this patent. I do not like to give costs in a case of this kind, because I cannot say that under the circumstances the jealousy on the other side was unreasonable."

Wood and others against Zimmer and others. An issue out of Chancery, to try if Zinck's Patent of 1812, for "a Method of making Verdigris," was a valid Patent on the 5th February 1813. Tried in the Common Pleas, 1st July 1815, before Chief Justice Gibbs. Verdict against the Patentee.

The defendant Zimmer had agreed to purchase Zinck's Patent for £2,500. but afterwards refused to pay to plaintiff, Wood, (the assignee of Zinck, who had become bankrupt since), alleging that the patent was invalid. The verdigris was proved to be superior to the French; and that it could be made by boiling copper in oil of vitriol, as directed by the specification; but there was no mention of aqua fortis, which Zinck was accustomed to put secretly into the boiler, in order to hasten the solution; but he had kept that secret ever since. The article was made and sold before the date of the patent.

Chief Justice Gibbs: "A patentee must disclose the most beneficial manner that he possesses of carrying on the invention, with as little labour and expense as it costs himself. The price he pays for his patent is, that he will enable the public to practise in the same way, and with the same advantages. If any thing which gives an advantageous operation is concealed, the grant is void. Though this specification should enable a person to make verdigris, substantially as good, without aqua fortis, as with it, still as it would be made with more labour, the omission is a prejudicial concealment, and a breach of the terms the patentee made with the public. The objection that the article was not new at the time of the patent (because a great quantity was sold by the patentee in the course of the previous four months) is somewhat new: some things are obvious as soon as they are made public; of others, the scientific world may possess itself by analysis; some inventions almost baffle discovery; but to entitle a man to a patent, the invention must be new to the world: the public sale of that which is afterwards made the subject of a patent, though sold by the inventor only, makes the patent void." "The jury will say whether aqua fortis was used by the inventor, and whether the invention was in public sale, before the patent;" in either case, the Judge thought the patent void. The jury found both in the affirmative. Verdict for the defendants.

Manton against Parker. An Action for infringement of Manton's Patent of 1803, for an Improved Hammer for the Locks of

Fowling Pieces. Tried in the Exchequer, 6th July 1814, before Lord Chief Baron Thompson. The Patentee Nonsuited.

The under side of the hammer, which forms the cover of the pan, containing the priming powder, has a small prominent lip, which applies very close against the touch-hole, and is hollowed out, and perforated with a small hole, so as to let the air pass through, but not the powder; the intention being to let the air pass out of the gun-barrel, when the wadding is rammed down, but to keep the touch-hole always full of powder, in order to prevent flashing or hanging fire. It was contended, that hammers corresponding to the description in the specification, had been tried before the patent, but did not answer; also, that Manton, in his own practice, could not make them answer, without making the holes so large as to let the powder pass through, from the barrel into the pan. On a witness showing the Court, that common gunpowder procured at an adjoining shop, did so pass through the hole in the lip of one of Manton's own hammers, the Lord Chief Baron said, "The powder passes through the same hole as the air; it seems to me, therefore, that the utility of this invention, and the purpose of this patent wholly fail; that of itself would be an answer to this action; besides, on other parts of the case, the evidence is strong." Plaintiff nonsuited. Davies, p. 327.

Joseph Manton against his brother John Manton. An Action directed by the Court of Chancery, to try if there was any violation of Joseph Manton's Patent of 1803, for an Improved Hammer, and of his Patent of 1806, for an Improvement in Double-barrelled Guns. Tried in the Common Pleas, 20th June 1815, before Lord Chief Justice Gibbs. Verdict against the Patentee.

The improvement in double-barrelled guns, consisted in fixing a grooved ruler between the two barrels, in a proper direction to form the line of sight, to point the gun to the object to be fired at.

Lord Chief Justice Gibbs: "It is necessary that the patentee should show that the invention is new, and unknown to the trade, and to the world before; that it is useful to the public; and that he has accurately explained the invention in his specification, separating that which is new, from that which is old, so as to enable a person of tolerable skill, to make the thing by means of his specification. Some men of experience, who we have heard, had never seen these inventions before the patents: *prima facie*, that is good evidence, but fifty witnesses proving that they never saw them before, would be of nó avail, if one was called, who had seen and practised them. It is proved, that the mode of directing the sight in double-barrelled guns, had been practised before. Several gentlemen have proved, that the hammer with the perforated lip is a useful application, but it is also proved that such hammers were made many years ago. Verdict for the Defendant Davies, p. 333.

Forsyth against Manton, in Chancery. An application for an Injunction to prevent the violation of Forsyth's Patent of 1807, for his method of giving Fire to Artillery and all kinds of Fire Arms. Heard 15th July 1816. Application refused, from doubts of the validity of the patent.

The invention was the application of percussion power for priming artillery and fire arms, by introducing it into a hollow cylinder, communicating with the touch-hole, and inserting a moveable plug or stopper into the cylinder, so as to inclose the powder between the bottom of the cylinder, and the end of the plug; by striking a blow on the plug, the powder can be ignited, and the piece fired off; the close plug preventing the fire of the percussion power from dissipating its force.

Lord Chancellor Eldon said, "The application of these chemical combustibles to the discharge of fire-arms by percussion, is not new; and I think it would be difficult to say, that this particular method of applying percussion, to ignite such chemical combustibles, for the purpose of discharging fire-arms, is a subject for a patent. An action should be brought at law, and then an injunction may be moved for."

Forsyth against Reviere. An Action for Infringement of Forsyth's Patent of 1807. Tried in the Court of King's Bench. Verdict for the Patentee.

It was held, that if several persons simultaneously discover the same thing, the publisher, or party who first communicates it to the public, under the protection of a patent, becomes the legal inventor, and is entitled to the benefits to be derived from the exclusive use of the invention.

George against Beaumont, Wackerbank and Martineau, in Chancery. An application to dissolve an Injunction previously issued, to restrain the Plaintiff from invading Constant's Patent of 1812 (assigned to Beaumont and Wackerbank), and Martineau's Patent of 1815, for methods of Refining Sugar by means of Charcoal, those parties having combined their interests under both Patents. Heard 10th August 1815. Injunction dissolved.

The injunction had been granted on the statement, that Mr. George had treated with the patentees, for the purchase of a licence to practise their patent; and having under that pretext, watched the process of refining sugar by means of charcoal, in their manufactory, he afterwards put it in practice for himself, without licence. It was now contended, that the refining properties of charcoal had been known before the patents, and therefore they could not be maintained.

The Lord Chancellor said, he had generally been of opinion that patentees were hardly dealt by, but he wonld by no means urge the right of patents beyond their lawful limits. The patent

might give too extensive a power to the holders, and great inconvenience might arise from imperfect or doubtful interpretation of their rights. Whether the patents were good or not, must be determined at law, for it was only in a few special cases that the Court could properly enter on such subjects. The patents must be protected till they are found bad. The mode in which the plaintiff had obtained information, whilst affecting to treat for a licence, could not be justified. If the patents should be determined good, damages might be recovered, not only by the patentees, but by the persons who had obtained licences from them. The injunction was dissolved, and an account ordered to be kept, of the extent to which plaintiff practised the inventions, until the validity of the patents could be tried at law.

Note.—This was compromised, and no trial took place. Mr. Martineau's process of refining sugar by animal charcoal has since come into general use, at first under licences, but afterwards the patent was generally infringed, and the patentee, being engaged in other business, abandoned it, rather than incur the expense and vexation of law proceedings against a whole trade.

Macfarlane against Price. An action for Infringement of M'Gregor and M'Farland's Patent 1808, for Improvements in the construction of Umbrellas and Parasols. Tried in the King's Bench, 20th February 1816, before Lord Ellenborough. Plaintiff Nonsuited.

Lord Ellenborough: The specification ought to state what is new, and what is old, so that a person by reading it, ought to be warned against the use of the particular invention. This specification does not say what is new and what was old, but it comprises that which is old, as well as that which is new, and it cannot be collected from the whole, in what the improvement consists.

Lord Cochrane against Smethurst. An issue was directed by the Lord Chancellor to try the validity of Lord Cochrane's Patent of 1813, "for a method or methods of more completely Lighting Cities, Towns, and Villages." Tried in the King's Bench, 22d February 1816, before Mr. Justice Le Blanc. Plaintiff Nonsuited.

The invention was a lamp for lighting out of doors, the flame being inclosed within a glass bowl or half-globe, with a vertical chimney placed exactly over the flame, to cause a draft and carry out the smoke, and also an air-pipe to introduce fresh atmospheric air, from the outside of the glass, and project it immediately upon the flame, at each side thereof, whereby a constant change of air is occasioned, to maintain the combustion. The merit and novelty of the lamp was proved, and that the defendant had adopted it from plaintiff.

Mr. Justice Le Blanc: "I am of opinion that the patent cannot be maintained; from the specification the invention appears to

consist in the improvement of an old street lamp, by a new combination of parts known before. The patent is too general in its terms; it should have been for an improved street-lamp, and not for a method of lighting cities, towns and villages." Nonsuit.

The King against Cutler. A scire facias to repeal Cutler's Patent of 1815, for Improvements in Fire-Grates or Stoves. Tried in the King's Bench, June 1816, before Lord Ellenborough. Verdict for the Crown.

This was a stove-grate for apartments, having a close chamber beneath the fire-place, to contain a sufficient quantity of coals for a whole day, that mass of coals forming the bottom of the fire-place, by winding up a handle whenever the fire requires fuel, all the coals in the chamber can be raised up, so as to elevate a portion thereof into the lower part of the fire-place; therefore, instead of throwing raw coals on the fire, the fuel is supplied under the fire, and the fire advances downwards, whereby all the smoke that is emitted by the raw coals below, ascends through the fire, and is consumed; the coals thus become converted into coke, before they are actually ignited.

New Patents Sealed, 1831.

To Andrew Ure, of Finsbury Square, in the parish of Saint Luke's, in the county of Middlesex, doctor in medicine, for his invention of an improved apparatus for evaporating syrups and saccharine juices.—22d September —6 months, for inrolment of specification.

To William Bingham, of Saint Mary Hall, Esq. and William Duke, gunmaker, both of Oxford, for their invention of certain improvements on fire arms of different descriptions.—24th September—6 months.

To Henry Hope Werninck, of North Terrace, Camberwell, in the county of Surrey, gentleman, in consequence of a communication made to him by a certain foreigner residing abroad, he is in possession of an invention for improvements in apparatus or methods for preserving lives of persons and property when in danger by shipwreck,

by speedily converting boats or small vessels of ordinary description into life boats, and other apparatus or means applicable to the same objects.—24th September—6 months.

To James Lang, of Greenock, North Britain, flax dresser, for his invention of certain improvements in machinery for spreading, drawing, roving or spinning flax, hemp, and other fibrous substances, dressed or undressed. —24th September—2 months.

To Joseph Gillott, of Birmingham, in the county of Warwick, steel pen maker, for his invention of an improvement in the making or manufacturing of metallic pens.—27th September—2 months.

To John Myatt, of Tabernacle Walk, Finsbury Square, in the county of Middlesex, tailor, for his invention of an article to be worn on the feet, as a substitute for pattens or clogs, which he denominates Myatt's Health Preserver. —27th September—2 months.

To Oliver St. George, of Great Cumberland Street, in the county of Middlesex, Esq. in consequence of a communication made to him by a certain foreigner residing abroad, he is in possession of an invention of certain improvements in machinery for acquiring power in tides or currents.—28th September—6 months.

To Miles Berry, of the Office for Patents, 66, Chancery Lane, in the parish of Saint Andrew's, Holborn, in the county of Middlesex, engineer and mechanical draftsman, in consequence of a communication made to him by M. Jean Nicholas Senechal, Ingenieur des ponts et Chaussees, residing at Versailles, in the kingdom of France, he is in possession of an invention or discovery of certain improvements in the boilers or generators of steam and other vapour, and in engines to be worked by steam or vapour for propelling or actuating machinery on land, and boats,

vessels, or other floating bodies on water, and also in the mode of condensing such steam or vapour.—28th September—6 months.

To John Heathcote, of Tiverton, in the county of Devon, lace manufacturer, for his invention of certain improvements in the machinery used for the making of bobbin or twist lace net, whereby net and other fabrics may be produced.—3d October—6 months.

To Samuel Crosley, of Cottage Lane, City Road, in the county of Middlesex, gas-meter manufacturer, for his invention of an improved gas-meter.—3d October—6 months.

To Daniel Dunscomb Bradford, a citizen of the United States of North America, but now residing in Dorset Place, in the parish of Saint Mary-le-bone, in the county of Middlesex, in consequence of a communication made to him by Solomon Andrews, residing at Amboy, New Jersey, in the said United States of North America, he is in possession of an invention of certain improvements in lamps. —4th October—6 months.

To Peter Young, of Fenchurch Street, in the city of London, rope and sail maker, in consequence of a communication made to him by a certain foreigner residing abroad, he is in possession of an invention of a new mode of manufacturing mangel-wurzel, for the purpose of producing various known articles of commerce.—6th October —6 months.

To John Christopher, of New Bond Street, in the city of London, merchant, for his invention of an improvement in clothes buttons.—7th October—6 months.

To William Drake, of Bedminster, near the city of Bristol, tanner, for his invention of an improvement or improvements in tanning hides and skins.—7th October—6 months.

To George Lowe, of Brick Lane, in the parish of St. Luke's, Old Street, in the county of Middlesex, civil engineer, for his invention of an improvement or improvements in, and connected with the manufacture of gas for illumination.—12th October—6 months.

To William Hale, of Colchester, in the county of Essex, machinist, for his invention of improvements in machinery or apparatus for propelling vessels, which improvements are also applicable for raising or forcing fluids.—13th October—6 months.

To William Ainsworth Jump, of Marston, in the county of Chester, gentleman, for his invention of certain improvements in drawing or extracting salt from salt pans.—14th October—6 months.

To John Smith and William Dolier, both of Liverpool, gentlemen, for their invention of a durable copy book or writing tablet, and improved delible ink to be used therewith.—14th October—6 months.

To John Cowderoy, of Britannia Street, Hoxton New Road, in the county of Middlesex, gentleman, for his invention of certain improvements in machinery or apparatus to be used in the process of making or manufacturing bread and biscuits.—14th October—6 months.

To Thomas Henry Pollard, of Park Street, Grosvenor Square, in the county of Middlesex, estate and house agent, for his invention of certain improvements in chimnies by the application of a mechanical apparatus as smoke conductor.—19th October—2 months.

CELESTIAL PHENOMENA, for November, 1831.

D.	H.	M.	S.	
1	0	0	0	☉ before the Clock 16 min. 15 sec.
1	8	0	0	☾ in conj. with 1γ in Virgo.
3	4	0	0	☿ in conj. with λ in Virgo
4	1	38	0	Ecliptic conj. or ● moon.
5	0	0	0	☉ before the Clk. 16 m. 15s.
5	0	0	0	☽ in conj. with γ in Libra
6	3	0	0	☽ in conj. with φ in Oph
8	5	0	0	☿ in conj. with 2 α in Libra
8	6	0	0	☽ in conj. with 2 μ in Sag.
9	11	0	0	☽ in conj. with σ in Sag.
10	0	0	0	☉ before the Clock 15m. 57 sec.
11	14	0	0	☽ in conj. with ♅ lon. 11, in Cap, ☽ lat. 30 N. ♅ lat. 40 S. diff. of lat. 1 10
11	15	0	0	in conj. with ϑ in Capri.
11	21	0	0	☽ in conj. with ♃ long. 14 in Cap. ☽ lat. 11 N. ♃ lat. 58 S. diff. of lat. 1 9
12	0	0	0	☿ Ecl. by the Sun.
12	6	45	0	☽ in □ or first quarter
14	5	0	0	♂ in conj. with λ in Virgo.
16	5	0	0	♀ in conj. with ι in Libra
17	1	0	0	☽ in conj. with ν in Pisces
18	0	0	0	☿ in conj. with λ in Libra
19	1	0	0	♀ in conj. with β in Scorpio
19	6	57	0	Eclip. oppon. or ○ full moon
19	18	0	0	☾ in conj. with γ in Taurus
20	0	0	0	☉ before the Clock 14 m. 17 sec.
20	0	0	0	☾ in conj. with α in Taurus
21	19	0	0	☾ in conj. with ν in Gemini
22	6	0	0	♀ in conj. with ϑ in Virgo.
22	12	35	0	☉ enters Sagittarius.
24	0	0	0	☾ in conj. with δ in Cancer
25	0	0	0	☉ before the Clock 12 m. 57 sec.
25	11	0	0	☾ in conj. with α in Leo
25	22	28	0	☾ in □ last quarter
26	8	0	0	♂ in conj. with 2 α in Libra
26	18	0	0	☾ in conj. with ♄ lon. 14 in Leo. ☾ lat. 2 25 N. ♄ lat. 1 46 N. diff. of lat. 39.
30	0	0	0	☉ before the Clock 11 min. 17 sec.

J. LEWTHWAITE
Rotherhithe.

The waxing moon ☽.—the waning moon ☾

Meteorological Journal, 1831.

1831.	Thermo. Hig.	Thermo. Low	Barometer. High.	Barometer. Low.	Rain in inches.	1831.	Thermo. Hig.	Thermo. Low	Barometer. Hig.	Barometer. Low.	Rain in inches.
Sept.						Oct.					
26	65	52	29,95	29,93	,025	11	63	48	29,66	29,62	
27	68	49	29,89	29,78		12	62	52	29,69	29,61	,15
28	69	50	29,74	29,68	,225	13	65	48	29,64	29,54	1 inch
29	68	53	29,61	29,59	,55	14	65	48	29,63	29,54	,05
30	68	49	29,53	29,34		15	59	47	29,90	29,71	
Oct.						16	62	40	30,22	30,06	
1	69	56	29,33	29,29	,925	17	61	39	30,32	30,25	
2	67	51	29,46	29,32	,025	18	57	44	30,33	30,30	
3	67	46	29,71	29,61		19	65	47	30,22	30,08	
4	61	48	29,87	29,73	,3	20	65	42	29,95	29,89	
5	61	49	29,96	29,81	,1	21	65	35	29,88	29,85	
6	65	44	Stat.	29,89		22	52	35	29,87	29,85	
7	69	50	29,74	29,69	,025	23	62	42	29,84	29,76	,15
8	60	49	29,63	29,57		24	62	35	29,96	29,89	,125
9	59	46	29,66	29,60	,575	25	59	42	29,86	29,65	1
10	64	46	29,61	29,53	,15						

THE

London

JOURNAL OF ARTS AND SCIENCES.

No. XLV.

[SECOND SERIES.]

Recent Patents.

To SAMUEL ROSCOE BAKEWELL, *of Whiskin Street, in the parish of St. James, Clerkenwell, in the county of Middlesex, brick and stone ware manufacturer, in consequence of communications made to him from certain foreigners residing abroad, and subsequent improvements made by himself, for an invention of certain improvements in machinery, apparatus, or implements to be used in the manufacture of bricks, tiles, and other articles, to be formed or made of clay or other plastic materials; parts of which said machinery are also applicable to other useful purposes.*—[Sealed 18th August, 1830.]

THESE improvements may be arranged under three heads; first, in the machinery or apparatus for grinding the clay

and other materials for making bricks, tiles, &c.; second, in the contrivance of a press for the purpose of squeezing or compressing the bricks, when partially dried into a more solid and compact state than bricks of the ordinary kind; and third, in a peculiarly constructed hand mould, in which the bricks are to be formed. The particulars of which the Patentee has set out in the following decription, referring to the figures shewn in Plate VII.

Fig. 1st is a section and elevation, and fig. 2, a plan of a machine, for mixing, grinding and tempering clay or other plastic substances, so as to prepare and render them fit to be applied to the forming or making of bricks, tiles, cornices, copings, &c., and also for the grinding, mixing, and tempering sand, lime, chalk, barilla, and for various other useful purposes, part only of the circular pit being shewn; *a, b,* represent the edge or border of the pit, which may be from thirty to forty feet in diameter, and from nine to eighteen inches in depth. A circular platform or mound *l,* being formed in the centre from twelve to sixteen feet in diameter; *c, c,* is a wheel, which may be from six to nine feet in diameter, and from three to nine inches broad on its rim; the rim of this wheel must be made to come into contact with the bottom of the pit *n, n*; the wheel may be made to traverse from *a,* to *b,* and *b,* to *a,* by placing the arm *d, d,* in various situations, varying from a radius line, or a line pointing to the centre of the pit, and which may be effected in different modes, namely, by turning the pinion *g,* by means of its handle or winch, so as to cause the metal tooth arc *i, i, i,* to bring the arm connected with it, and which moves upon the pin *m,* into such a position as is shewn by the dotted lines in fig. 2, the pinion being prevented from moving, by means of a peg placed in one of the holes formed in the circular plate *o,* to

receive it, and which acts against the winch or handle of the pinion *g*.

The wheel *c, c*, is made to traverse in the contrary direction, by changing the position of the arm *d, d*, accordingly from *h*, to *k*; *e, e*, and *f, f*, are supporting wheels to keep the shaft *d, d*, from bending, but which, however, may occasionally be dispensed with. The clay or other materials spread all over the circular pit, will thus be mixed, ground, or tempered by the repeated action of the wheel *c, c*, in spiral courses passing over them.

The top of the circular mound or platform *l*, in the centre of the pit, is made perfectly flat, for the wheel *f, f*, to travel on, and a square hole or pit is made in the centre of it, to receive the post and frame *j, j, j*, which supports the arm *d, d*; *m, m*, are the branches of the yoke, to which horses or other animals are to be affixed, in order to actuate the machine, although it may also be turned by other powers, such as steam, water, or wind, if found desirable. A counterbalance or weight, as shewn in fig. 1, may be hung upon the shorter end of the arm *d, d*, to steady it; and the spindle *p*, at the end of it must be made cylindrical, and of a sufficient length to allow of it rising or falling in the post and frame *j, j*, according to the greater or lesser quantity of clay or other materials to be spread in the circular pit, in order to be operated upon. Fig. 2*, is an end view, the different parts being indicated by the same letters of reference as in fig. 1.

Fig. 3, is another method of varying the position of the arm *d, d*, where, instead of the toothed arc, and pinion before described, two small windlasses *g, g*, shewn in fig. 3*, are mounted upon the upper part of a metal frame *i, i*, and around the barrels of which said windlasses,

ropes or chains, may be coiled and uncoiled by means of a winch or handle applied upon the axis of the windlasses, and which said ropes or chains being affixed to the arm *d, d,* the windlasses may be kept in their required position, by means of pegs being inserted into the rings of holes provided for the purpose, as shewn in fig. 3*, and as before mentioned.

Another mode of causing the wheel *c,* to traverse over the whole extent of the pit *a, b,* in circles instead of spirals, as above described, is shewn in elevation in fig. 4, in plan in fig. 5; and endways in fig. 4*; in which figures, a toothed metal rack is shewn, as affixed upon the upper surface of the arm *d, d,* into which a pinion acts, which is mounted upon an axis, working in holes formed to receive it in the metal frame, which is mounted upon the top of the upright cylindrical stem *p,* and by means of a winch or handle affixed upon the said axis, the pinion may be turned a little at each revolution of the wheel *c,* around the pit, in order to cause it to run in fresh circular paths; or instead of a rack and pinion, two barrels *q, q,* may be employed turning upon axes, working in holes formed in the upper part of the metal frame, with squared parts at their ends to receive a handle or winch; and arround these barrels cords or chains may be applied, which are likewise affixed to two studs or pins, driven or otherwise secured into the upper surface of the arm *d, d,* and which cords pass underneath two loose barrels *q, q,* also turning on an axis mounted in the said frame, and thus by turning either of the two uppermost barrels a little at each revolution of the wheel *c,* the cords or chains will move the arm *d, d,* within the metal frame a sufficient quantity to cause the wheel *c,* to move continually in fresh circles. Two friction rollers are mounted in the lower part of the metal frame, to assist the motion

of the arm *d, d,* and a supporting roller mounted in a proper frame, may be also applied, as shewn in fig. 4, to run upon the level surface of the central platform or mound, and instead of one wheel *c*, only, two or more may be employed, and these also on each side of the mound or platform, if thought necessary.

Fig. 6, represents another mode of effecting the latter object; here a female screw is formed in a wood or metal head, which is affixed upon the top of the cylindrical spindle *p*, and a corresponding screw is made upon the arm *d, d,* which can be turned a little at each revolution of the wheel *c, c,* around the pit, by means of a pin or lever inserted into either of the holes, formed through the screw to receive it.

Figure 7, exhibits an arm *d, d,* mounted upon the top of the spindle *p*, which has a cylindrical stem and shoulder formed upon it, the cylindrical part being passed through a hole formed to receive it, in the centre of the arm *d, d*; this arm has a right and left threaded screw, upon which female right and left threaded screws, made in sockets, naves or boxes, fitted into the centres of the wheels *c, c,* act; and thus cause those wheels to run in spiral courses over the whole extent of the circular pit. It being however necessary to reverse the motion of the arm, to cause them to move in the contrary direction, other modes may also be employed to produce a backward and forward lateral movement of the wheel *c, c,* such, for instance, as the well known mangle motion; namely, by affixing a windlass, barrel or wheel, upon the moveable head, upon which a chain, strap, or rope may be wound and unwound, by means of a winch or handle applied upon the axis of the windlass or barrel. The arm *d*, may be prevented from rising too high, by affix-

ing a screwed nut upon the top of the spindle *p*, as shewn in fig. 7, or upon the lower end of it, as shewn in fig. 3.

Having thus described various machines for mixing, grinding, and tempering the materials, the Specification next proceeds to describe various machines for forming or pressing bricks, tiles, &c. when in a partly dried state.

Fig. 8, is an external elevation or side view of such a machine; figs. 9, and 10, two internal views of it, in different situations; and fig. 11, a plan or top view of it, in all of which figures, the same letters of reference indicate the similar parts of the machine; *a, a,* &c. is the wooden or cast iron frame of the machine; *b, b,* the sides of the mould; *c,* the swinging frame, for keeping down or removing the upper part of the mould; this frame is mounted upon a strong axis *d,* which moves in bearings formed in the lower ends of the swinging frame *c,* on the ends of the pivots of the axis *d,* and these must be screwed nuts, to keep the swinging frame steady on the same; *e,* the main lever united to, or affixed firmly to the axis *d*; *f, f,* two side links, which connect the main lever *e,* with a shorter lever *g,* affixed upon another axis *h,* shewn in fig. 11*, which turns in bearings or eye bolts affixed in the end of the frame.

Upon a square, formed on the end of the axis *h,* a hand lever *j,* fig. 8, is affixed, in order to actuate the apparatus, as will be hereafter described; *k, k,* are two webs affixed upon the axis *d,* to keep it in its place within the gaps formed to receive it on each side, within the lower side rails of the frame *a*; *l,* is a short lever, affixed upon the axis *d,* the use of which is to raise the stem *m,* of the piston *n,* which forms the bottom of the mould, when the hand lever *j,* is brought into the position shewn in fig. 8, and by the dotted lines in fig. 9, in order to compress the brick in the mould.

When this has been effected, the cover of the mould *c*, is to be thrown aside; the hand lever *j*, is then to be brought into the position shewn by the dotted lines in fig. 10; and the piston *n*, is to be farther elevated, so as to push the brick out of the mould in the following manner:—

In fig. 10*, at *o*, is shewn the necks or pivots, the ends of which turn in bearings affixed underneath the upper side bars of the frame *a*; *p*, is an arm or lever, affixed upon the axis *o*; to the end of which, the two links *q, q*, are jointed, and which are also jointed to the stem *m*, of the piston *n*. A hand lever *r*, is affixed upon a squared part, formed upon the outer end of the axis *o*, which rests in the position, shewn in figs. 8 and 9, whilst the brick is in the mould: but upon bringing it into the situation shewn by the dotted lines in fig. 10, it raises the piston *n*, and lifts the brick out of the mould, ready to be taken away.

The pressing of the brick in the mould is effected by bringing the hand lever *j*, into the position shewn in figs. 8 and 9, which depresses the levers *g*, and *e*, and raises the short lever *l*, which acts against and elevates the piston *n*, at the part *s*, of its stem, as shewn in figs. 8 and 9. The lower end of this piston stem is guided and steadied by means of five screws; three of which are passed through a strong cross bar *t*, one of them *u*, acting against the edge of the stem on one side, whilst the two others *v, v*, bring a back plate into contact with its opposite edge; two other screws *w, w*, fig. 11, also pass through the lower side rails of the frame, which act against the side of the stem.

In order to keep the piston *n*, steady whilst the brick is removed, the lever *r*, is to be lodged between two pins *x, y*, let into sockets and moveable at pleasure. The

lower one *x*, preventing the piston *n*, from rising too high, and the upper one keeping it steady. In figs. 8, 9, and 10, *z*, is another pin let into a socket in the side of the frame *a*, in order to limit the rise of the piston *n*, and thus to cause all the bricks to be made of an uniform thickness.

Across the upper plate *c*, of the mould, a strong cross bar is affixed by means of screws, and having holes at each end of it, through which the upper ends of the sides of the swinging frame *c*, are passed and secured by screwed nuts, above and below the cross bar, as shewn in fig. 8.

Figs. 12 and 13, are a front and side view of the piston *n*, and its stem *m*. Fig. 14, a plan of the axis *d*, and lever *e*, a side view of which is shewn in fig, 15; and fig. 16, is a plan of the axis *h*, with its lever *g*.

Fig. 17, is another press for bricks, in which the piston *n*, is raised and lowered by means of a toothed metal rack *c*, formed upon its stem *m*, into which a pinion *d*, acts, upon the axis of which a winch or handle may be affixed to turn it; and it has also a ratchet wheel *e*, affixed upon it, into the teeth of which a click, catch, or pall *f*, falls, in order to retain the piston in its position. A friction roller *g*, is placed at the back of the stem, to keep the rack *c*, in its place.

Fig. 18. represents another press for bricks, in which the movements of the piston *n*, in the mould are effected by means of two metal rods, one of which is shewn at *h*, in fig. 18, and which are jointed to the piston above; and to a stud or pin *i*, below, which is affixed in one of the arms of a wheel *i*, which has teeth formed partly around it, into which a pinion *d*, acts, when turned by means of a winch or handle, affixed upon its axis. A ratchet wheel *e*, with a click *f*, is also here provided, to

retain the pinion in its position. Fig. 19, is a plan or top view of the press shewn in fig. 17; and fig. 20, is another plan of the press exhibited in fig. 18.

In fig. 17, the top of the mould *c*, is closed by means of a metal plate dovetailed on its edges, and which slides in dovetailed grooves made in the sides *b*, *b*, of the mould to receive it. Fig. 19, shews the same in plan; in figs. 18, 20, 21, and 23, the top of the mould is shewn as closed, by means of a metal lid *c*, mounted either upon a rule joint hinge, or upon hinges on one side of it, and the other kept closed when in use, by means of a catch, either with or without a spring. Fig. 22, exhibits the top of the mould as opened.

For compressing curved tiles in the mould, the under side of the top of the mould must either be hollowed, or hollow blocks be introduced, as shewn in figs. 22, and 23; the top of the piston being also rounded to correspond therewith; or another rounded block be also introduced into the mould, as shewn in figs. 22 and 23.

Fig. 24, is a top view of a spring catch brick mould, intended to mould bricks by hand; and fig. 25, represents the same as opened; *a*, *a*, are the sides of the mould; a joint *b*, is made at one of its angles, extending the whole depth of the mould. Two angular ears, one of which is shewn at *d*, in both figures, are formed one upon the upper, and the other upon the lower edges of the end of the moveable part of the mould; and are passed through corresponding slits or holes, formed to receive them in the counter part of the mould, and thus to keep the sides steady. The end *c*, being also received into another gap made inside of the mould, a spring catch is affixed by screws upon the outside of the end of the mould (between the ears) which passes through a square hole made to receive it, in the corresponding side of the

mould, and hooks itself fast when the mould is shut, but can be readily released, by pulling the spring catch back.

Having thus shewn and described various modes of carrying these inventions into effect, the Patentee lastly declares that he does not mean or intend hereby to claim as his improvement, any of the various parts which may have been already known or in use, but only in combination; nor does he mean to claim the mode of grinding clay or other materials, or mixing, or tempering them in mills, by means of large stones employed as wheels, where they always run in the same circle or track; but he does hereby claim the power of causing them either to run in spiral paths, or in circular ones, continually varying in their diameter, until the materials spread over the whole bottom of the pit shall have been repeatedly operated upon. The Patentee says he has seen in Lancashire, in several of the potteries, stones of four or five feet in diameter, used in grinding or tempering clay, and and revolving spirally, by the action of screwed shafts; but one end of which shafts rested on a wheel, and the other end supported upon a post in the centre of the floor, so that the stones were suspended upon the shaft at the height of two or three inches from the floor; and which said floor was merely a flat surface, without borders or forming a pit; whereas his wheels came into contact with the floor of the pit, excepting when the clay or other substances intervene, and raise them therefrom. The borders of the pit also confine the clay or other materials, and prevent them from spreading sideways, as in the ordinary methods. To the clay mills, or stones revolving on a screwed shaft, as above described, he has therefore no claim whatever. It may be well to observe that the bricks or balls of clay, previously to being

placed in the press must be in a half dried state, or in the same state as common bricks are taken, to be "smoothed or polished," and their external surface, or sides, ends and faces be rubbed with fine sand or dust (the latter of which is generally found in abundance in or near brick kilns), in order to prevent them from adhering to the moulds. It is also observed that this Patent is not for pressing bricks, tiles, cornices, &c. generally, but only for the particular description of presses that have been herein shewn and described.—[*Inrolled in the Rolls, Chapel Office, February,* 1831.]

Specification drawn by Mr. Gill.

To SAMUEL HALL, *of Basford, in the county of Nottingham, cotton manufacturer, for his having invented or found out a new method of, and apparatus for generating steam and various gasses to produce motive power.*—[Sealed 31st May, 1828.]

THE intention of the Patentee is, to combine highly elastic airs with steam, for the purpose of working the piston of an engine constructed upon the principle of the single stroke atmospheric steam engine.

The very great advantage expected to result from this union of elastic air with steam as a motive power, induced us to withhold our report of this invention, until sufficient time had been afforded to the Patentee to bring his plans into effective operation; it does not however appear, that the anticipated advantages have yet been realized, whether from defects in the construction of the apparatus, or in the principles upon which it is founded, we are not informed; but, that a something is still wanting, appears evident, and that something we understand, the inventor is about to supply, under the protection of a new patent.

The invention specified under the above title, is divided into four heads; first, the construction and adaptation of an air cylinder, which is to be employed as a pump, to inject and condense a quantity of atmospheric air intended to be heated by passing through the furnace; second, the peculiar construction of generator from which the steam is to be evolved; third, the receiver, into which the steam and heated air is passed, previous to its admission into the working cylinder; and fourthly, the working cylinder itself, furnished with peculiar entrance, and exit valves for the admission, and discharge of the heated air and steam.

One of the objects proposed, is the superior combustion of the fuel in the furnace, promoted by the artificial atmosphere of condensed air, which causes it to give out a much greater degree of heat, than the same quantity of fuel would do under any other circumstances, and consequently effects an economy in its consumption.

The furnace is made within a cylindrical iron vessel of very considerable substance, in the solid parts of which, various tubes or channels are formed for the reception of the water intended to be evaporated into steam. These tubes or channels are all connected together by contorted passages at the top and bottom of the generator; and an aperture at bottom allows part of the steam to discharge itself into the furnace.

The piston of the pump by which the atmospheric air is forced into the furnace, is intended to be of about ten times the area of the piston in the working cylinder, in order that as the two pistons work together simultaneously, the former may throw in very large volumes and condense the atmospheric furnace within the generator, to a pressure of about a hundred and fifty pounds upon the square inch.

The steam and the heated air both pass into a vessel called a receiver, which is furnished with an inlet and outlet valve, and from them they proceed through the induction aperture, to the under side of the piston in the working cylinder, in the usual way.

The elastic force of the steam and vapours raise the piston until it has nearly reached the top, and then an eduction valve opening, allows the steam and vapour to escape, when the piston descends again in its cylinder, by the superincumbent pressure of the atmosphere, and thus the mechanical or motive power is obtained, as in other single stroke engines.

The upward stroke of the piston in the working steam cylinder, produces a downward stroke of the piston of the air cylinder, owing to their mutual connection to a vibrating beam, and the act of injecting a volume of air, into the furnace as above described, causes a similar volume to be forced therefrom into the receiver.

In the event of the air cylinder being no larger than the working steam cylinder, it is proposed to work the piston in the steam cylinder, by expansive steam and vapour, that is to shut the induction valve, and thereby cut off the supply of steam and vapour, when the piston has made about one tenth part of its upstroke, the remainder of the stroke being effected by the expansion.

These are the leading features proposed, in which it would appear that the effect of the increased elasticity of the condensed air, caused by heating it in the furnace, is the only additional power anticipated.

The Patentee has descanted upon the minor parts of the machinery at great length, in a most elaborate specification, and with numerous figures of the detached parts, and their susceptible variations in detail, but for the reasons before given, we do not think it necessary at

present to be more diffuse; when the subsequent improvements are matured, and given to the public under the proposed new patent, we shall have much pleasure in laying before our readers the complete subject, with our views of its practical advantages.—[*Inrolled in the Petty Bag Office,* November, 1828.]

To JOHN JONES, *of Leeds, in the county of York, brush maker, for his having invented or found out certain improvements in machinery or apparatus for dressing and finishing woollen cloths.*—[Sealed 21st August, 1829.]

THE object of this invention, in the first instance, is to produce a more beautiful and permanent lustre on the faces of the finer descriptions of woollen cloths than is obtained by the ordinary process of dressing, by brushing and pressing, or by the operation commonly called roll boiling. There is also an apparatus to be attached to a gig mill, or brushing mill, for the purpose of keeping the cloth tightly distended, and preventing it from wrinkling while under the operation of the teasles or brushes.

The first of these objects is proposed to be effected, by pressing the surface of the cloth against a smooth firm surface, while the cloth is under the operation of boiling or steaming, which is described as done by the following means, (viz.) Applying to the surface of the cloth smooth polished plates, or sheets of copper, or smooth surfaces of wood.

The cloths are to be spread out, and tightly distended upon the smooth faces of these plates of metal, or surfaces of wood, and being immersed in hot water or steam,

are then to be submitted to very considerable pressure, and after being thus operated upon for a sufficient space of time, the face of the cloth will, by the pressure and the moist heat, acquire a smooth brilliant and soft surface, superior to that obtained by any other operation of dressing woollen cloths heretofore practised.

The Patentee proposes two methods of performing this operation; the first is by providing a large vat or flat vessel, about two yards wide and twenty-two yards long, which will afford a sufficient area to receive the end of cloth, (that is half the piece) extended upon its bottom. When the cloth has been smoothly spread in this vat, he places a sheet of polished copper plate of equal area, to the part upon the face of the cloth, then turning over the other end of the piece of cloth, on the reverse polished surface of the copper, he lays that smooth in like manner, and having repeated the same with a succession of pieces of cloth, and sheets of copper placed one upon another, until the vat is considered to have a sufficient charge, a flat surface of board or any other suitable material, is then lowered down upon the pile of cloth and plates, and a series of hydraulic presses brought to bear upon it, so as to give the pressure to the cloth required.

Plate IX, fig. 1, represents a portion of one of these vats *a, a*, with the hydraulic presses *b, b*, adapted thereto; fig. 2, is a transverse section of the same, shewing the cloth and copper plates within under pressure. As the construction and mode of working an hydraulic press is well known, it is not thought necessary to describe it, except that it should be said that the several presses *b, b*, are all connected together by the water pipe *c, c*, and are consequently all acted upon simultaneously by one pump or lever.

Intead of the machinery and hydraulic presses above described, it is proposed under some circumstances, to employ a close vessel to be filled with water, in which the cloths are to be placed, with the plates of copper as above described, and the pressure effected by the hydraulic pump, applied thereto in the ordinary way. Under either of the plans, however, it is proposed to heat the water in which the cloths are immersed, by steam conducted into the vat by means of a pipe from a boiler, in any convenient situation nearly contiguous, and in this heated medium the cloths are to remain from twelve to twenty-four hours, or perhaps more, according to the quantity of the cloth, its colour, and the required lustre, or height of dress which may be desired.

The second plan proposed is by rolling up the cloth in contact with a thin sheet of smooth copper, or other smooth, fine, but flexible substance.

Fig. 3, shews the front view of a machine intended to be employed for the purpose of rolling the cloth and sheet of copper together; fig. 4, is a transverse section of the same; *a*, is the roller, upon which the piece of cloth is first rolled, before it is brought to the machine; *b*, is a roll, round which the sheet of thin copper, or other smooth firm material is wound; *c*, is the roll, upon which it is intended that the cloth and sheet of copper together should be rolled; *d*, is a pressure roller, held down with considerable force against the roller *c*, by means of a weighted lever, for the purpose of causing the lengths of cloth and sheet copper to be very tightly rolled together. It is unnecessary to point out the particular arrangement of toothed wheels, by means of which, the several rollers are made to turn simultaneously, so as to preserve the tension of the cloth; it is only to be observed, that the cloth must be delivered with considerable tension, in order

that it may pressed firmly by the surface of the sheet copper by which it is to be enveloped.

Motion is given to the rollers by a winch, or by a baud passed over the rigger *e*, which by the gear of pinions and wheels, causes the cloth and sheet copper to be drawn tightly as they are wound on, and when that is done, the roll is enclosed within a wrapper of canvass or any other material, and very tightly braced, and afterwards immersed in a boiler, and treated in the way usually pratised when submitted to the ordinary operation called roll boiling.

Instead of the sheets of copper above mentioned, the Patentee proposes under some circumstances to employ slips of wood, closely fitted together, and held fast by rods passed through them, and screwed up at the ends, see fig. 5; these slips of wood are to be rendered perfectly smooth, and their lengths to correspond with the breadth of the cloth, and as many may be connected together as will form a flat smooth tablet, equal to the length of twenty-two yards, which tablets may then be employed as the smooth surface to press against the face of the cloth in the vat, in place of the sheets of copper, as above described

The other apparatus to be attached to a gig mill or brushing machine, for the purpose of distending the cloth in breadth, while it is under the operation of brushing or gigging, is a skeleton roller, formed by ribs of wood, which ribs are enabled to slide endwise.

Fig. 6, is a representation of this skeleton roller; *a, a,* is the axle that it turns upon; *b, b,* the ribs, of which there are two series mounted in the blocks *c, c,* each series reaching to about the middle of the roller. The one set of the ribs slide in one direction, and the other set in the

opposite direction, which movement is effected by the following contrivance: —

The ribs are attached to blocks, and enabled to slide therein by dovetails or by pieces on their under sides, let into sockets cut in the blocks in the form of the letter T, and they are slidden to and fro in those sockets by means of a stud on the under part of each rail, which acts in an oblique groove in one of the end pieces *d, d.*

These end pieces *d,* slide loosely round the axle of the skeleton roller, but are prevented from revolving with the roller when it is in operation, by a projecting pin *e,* extending outwards from each end piece, which pin is intended to stop against a fixed part of the frame of the gig mill or brushing machine, to which the apparatus may be attached.

It will now be perceived that as the skeleton roller goes round when mounted in a machine, the studs on the under part of each rib being inserted into the oblique groove in the stationary blocks *d, d,* that the ribs will be severally slidden outwards as their studs approach those parts of the oblique grooves which are farthest from the centre of the machine, and inward as they approach those parts of the oblique grooves which are nearest to the centre of the machine, the ribs continuing, as the roller goes round, to slide outwards at the front part of the roller, and inward at the back part of the roller.

It is only necessary further to say, that the ribs being slightly notched on their outer surface, take hold of the cloth as it passes over them, and by sliding outward, of course distends it breadthwise, and keeps the cloth tight and free from wrinkles, as it advances to the brushing or teasle roller of the gig mill or brushing machine.

This last part of the invention, which is extremely ingenious and simple, appears to have been found very

effective in brushing and dressing machines, and is now in extensive operation in many of the clothing works in different parts of the kingdom; the pressing, or former part of the invention, has not however yet we believe been sufficiently matured to answer its purpose in a satisfactory manner.—[*Inrolled in the Rolls Chapel Office, February,* 1830.]

Specification drawn by Messrs. Newton and Berry.

To THOMAS GETHEN, *late of Furnival's Inn, in the county of Middlesex, but now of Dursly, in the county of Gloucester, Gentleman, for his invention of certain improvements in dressing woollen cloths.*—[Sealed 21st November, 1829.]

THE nature and intention of this invention is to submit or place the cloths to be operated upon by the process of boiling, scalding, or steaming, in such form and manner as is hereinafter described, that it may receive during either of the above processes, a continued equal and undisturbed pressure. The machinery and apparatus necessary for the purpose, are made and used in the following manner:—first, provide a vat or cistern of such length and breadth, as the goods or cloth to be operated upon may require. Thus for instance, if it is wished to operate upon woollen cloths, of the customary trade lengths, of twenty-one yards long, and sixty-three inches wide, provide a vat or cistern about twenty-two yards long, and eight feet wide, upon which a lid made steam tight is to be fitted, which with the whole of the apparatus is represented in Plate X, and shown in several figures, of which fig. 1, is an end view of the vat shewn in section; fig. 2, a side view of the same and fig. 3, a top view, the similar letters referring to corresponding parts of the

apparatus in all the three figures. Provide long planks *a, a,* of about three inches thick and eleven inches deep, or several planks connected together at their ends, so as to constitute a sufficient length when placed edgewise along the bottom of the vat or cistern, to reach or extend the whole length of the vat or cistern. These planks are to stand in parallel rows, at the distance of from two to three feet apart, and have mortice holes cut through them in the manner described in the figures, in order to receive the bottom press bars ,as hereinafter described.

The bars which communicate the pressure, are made and used in the following manner, and are distinguished by the following names, viz. the main bottom bars *b, b,* the main top screw bars *c, c,* the bottom cross bars *d, d,* the top cross bars *e, e,* the top saddle bars *f, f,* and the bottom saddle bars *k, k,* and the sister bars *g, g;* the main bottom bars *b, b,* are placed across the vat or cistern through the morticed holes *h, h;* in the planks *a, a,* the bottom cross bars *d, d,* are placed in like manner across the vat or cistern, and rest in the notches *i, i, i, i*; the bottom saddle bars *k, k,* are placed lengthways of the vat or cistern, each of them resting or laying upon one of the main bottom bars *b,* at about the middle or centre of each main bottom bar, and the ends of the bottom saddle bars *k,* press under the middle of the bottom cross bars. The sister bars *g, g,* are placed in notches made in each end of the main bottom bars *b*; a pin is then passed through holes made in the main bottom bars, and through the sister bars *g, g,* by which pin they are connected together.

I then provide boards, which I call press boards, for the purpose of pressing the cloth. In making these press boards, I take a supposed given length of twenty one yards long and sixty three inches wide, as enabling me to

give a more clear and distinct description both of making the apparatus as well as of carrying on the process, but I claim the right of employing the same kind of apparatus to cloths of all lengths and breadths. For this purpose I saw out beech or other suitable boards of about three quarters of an inch thick and about nine feet long, and as wide as the timber will permit, which I recommend to be placed transversely or diagonally upon and across the edges of the planks *a, a*.

The beech or other suitable boards are carefully jointed to each other and dowelled together, and their ends are then sawed off to make the press boards of the required breadth. In order to keep the joints of the beech or other suitable boards firmly together, thin brass or other plates are screwed, or otherwise fastened across the joints upon the ends of the boards. The whole surface of the press board is then made smooth. In or upon these thin brass or other plates, small studs or hooks are fixed, to which the chains and the irons *l, l*, are to be attached, in order to move the press boards when required. At the height of about ten feet from the bottom of the vat, beams are placed across the building in which the vat is situated, for the purpose of supporting the machinery by which the press boards are to be drawn up and let down, and removed from or brought to the vat.

This machine for raising and carrying the press boards is intended to be moved on the beams by toothed pinions *p*, taking into racks *q*, fixed to the beams. The method of moving a press board to or from the vat or cistern, is by attaching the chains and irons to the hooks or studs, when by turning the wheels *m, m*, the shafts *n, n*, with the sheaves *o, o*, upon them, are put in motion, whereby the chains *l, l*, are wound round the sheaves *o, o*, and the press board is thereby raised up or let down.

In order to move the press board sideways after it is

wound up, the shafts with the sheaves *o, o*, are mounted in the carriages *r, r*; these carriages are moved along the beams by turning the handle of the pinion shaft *p*, which pinion taking into the rack *q*, causes the machinery to travel along the beam, observing that on the top of each of the beams grooves are made to guide anti-friction rollers placed under the carriages *r*. In order to place the cloth in the vat ready to be operated upon (it having been previously raised or rowed at the gig mill), it is laid flat upon a press board, care being taken not to disturb the face of the cloth; another press board is then placed upon the cloth, and then another cloth is laid upon the second press board, and again another press board is placed upon the cloth, and so on; a cloth and a press board may be placed alternately until so many cloths as may be convenient be laid or placed in the press.

When the required number of cloths are placed in the press (a press board being the last at top), the top cross bars *e*, are placed across the upper press board; the top saddle bars *f, f*, are then placed or laid lengthways of the vat or cistern, and made to lay or rest upon the top cross bars. The main top screw bar *c*, is then placed across the top saddle bars *f*, and the sister bars *g, g*, being attached to the top main screw bars *c*, in the same manner as they are described to have been attached to the main bottom bars. The screws *s, s*, as shewn in the main top screw bars *c*, are then turned so as to press the top saddle bars *f, f*, by which means the top cross bars *e*, are pressed down, and at the same time the sister bars *g, g*, by drawing up the main bottom bars *b*, force or raise up the bottom saddle bars *k, k*, and also the bottom cross bars whereby an equal degree of pressure is given and received at the top and bottom of the press boards. I wish it to be observed that though I have here described the pressure as being obtained by means of the screws *s*, yet I do not in-

tend to confine myself to the use of screws, under all circumstances, as an effective pressure might be obtained by the application of levers with weights, or by the immediate force of gravitation, or by some other contrivances.

The press being screwed tight and the lid of the vat or cistern placed thereon, steam from a boiler is conducted along the bottom of the vat or cistern, by a pipe, which pipe having small holes made in it at regular distances, will permit the steam to pass into the cistern, whereby a regular heat is produced therein, when it may be prepared to boil or scald the cloth in water, the vat or cistern is to be filled with water, sufficiently high to cover the press boards, and the cloth and the water to be made hot by any of the methods usually adopted for such purpose; the degrees of heat must be regulated according to the colour of the cloths under operation; cloths in a white state may receive as high as 212 degrees of heat, Fahrenheit, but above 160 degrees will endanger the colours of blue; black, and brown cloths, will bear one hundred and sixty degrees, or some of the best dyed black and brown colour, will not be injured at one hundred and eighty degrees, or even higher; the more delicate colours will not bear so high a heat, but they are to be regulated in regard to the degrees of heat, in the same manner and in the same proportions as the heat is increased or decreased upon coloured cloths, when they are submitted to the usual practice of boiling, scalding or steaming coloured cloths, when rolled upon rollers. The time allowed for the process should be about six hours, after the heat is up to the degrees stated above that is to say for black cloth, when the steam or water has acquired about one hundred and sixty degrees of heat, that heat should be continued about six hours, and the same rule should be observed in regard to the heat re-

quired for other colours, that is reckoning six hours from the time at which the heat necessary for each colour, is up to the degrees stated above.

The operation may be repeated one, two, or more times, or even oftener, when it be wished to obtain a higher lustre, or when the cloth has been submitted to the operation one or more times, it may with advantage be rolled and boiled, or scalded in the usual manner. The cloth should be taken out of press between each time of performing the operation, allowing it first to have become perfectly cold, and after being taken out it is to be run up at the gig mill with plenty of water.

The above described methods of placing a board between each cloth will give a particular style of face to the cloth, which may also be done in a manner nearly as advantageous, by placing two cloths between each press board in the following manner—that is, by laying or placing a cloth with its face side downwards upon the press board, and a second cloth being laid or placed with its back upon the back of the former, both of these cloths will, upon a press board being laid or placed upon them, receive the pressure of a press board upon their face sides. Two cloths and one press board may thus be continued alternately in the same manner as with cloths laid or placed singly between the press boards as described above. Instead of laying or placing the cloths in press in either of the above described modes or methods, a cloth may be laid upon the lower press board, a second cloth may then be laid or placed upon the first, and then a third upon the second, and so on cloths may be laid or placed in succession upon each other till the required number be in press, when a press board being laid or placed upon them, and the press being set and screwed, they may receive the process of boiling, scalding, or steaming.

And, lastly, I consider that inasmuch as this my improved machinery or apparatus, when employed as above described, affords the means of effecting an improvement in the dressing woollen cloths, and avoids the creases or fold marks, produced by the short presses hitherto in use; and that as this my invention is an improvement upon the process of dressing of woollen cloths (as hitherto carried on or effected by the said short presses), I am entitled to all the privileges and advantages which may occur or rise from the exclusive use of this my apparatus or machinery, which I claim as new in its constructions and application to the purpose of pressing cloth, while under the operation of boiling, scalding, or steaming.—[*Inrolled in the Rolls, Chapel Office, May,* 1830.

Specification drawn by Messrs. Newton and Berry.

To Samuel Morand, *of Manchester, in the county palatine of Lancaster, merchant, for his invention of an improved stretching machine.*—[Sealed 14th April, 1831.]

This improved stretching machine is for the purpose of extending the width of calico pieces, or of other cloths or fabrics which are woven of cotton, silk, wool, flax, or other like material, in cases when such woven fabrics have become shrunk or contracted in width in consequence of dying, bleaching, or other process to which the said woven fabrics may have been subjected. The manner in which this invention is to be applied is shewn by several figures in plate X. Fig. 4, represents a lateral elevationn of the ma chine in its complete state. Fig. 5, is a horizontal view or plan representing the chains, chain races and pins,

cross rails and card roller, hereinafter described, placed on the frame in order for working. Figs. 6 and 7, represent two elevations of the opposite ends of the machine, the chains and chain races being omitted. In the several figures the same letters of reference are used to denote the same parts of the machine.

Figure 4, *a, a, a,* represent side frames of iron, connected by the cross rails 1, 2, and 3, (best seen in fig. 5,) and by the cross bars *a, a,* as seen in figures 6 and 7. These frames support the axis *w*, of two chain wheels *g, g,* the side of which is shewn in figure 4, and the edges and axis of both are shewn in fig. 7. The wheels *g, g,* are moveable along their axis *w*, and can be fastened on any part of the length thereof, by binding screws *w, w,* (as seen in fig. 7,) or otherwise. The two wheels *g, g,* may be fitted on their axis *w,* with squares or with fillets, which will allow the wheels to move freely along the axis, but not to turn round thereon, and instead of binding screws to fasten the wheels on the axis, projecting brackets similar to those hereinafter referred to by the letter *m*, may be fixed on the ends *d*, of the chain races, to reach down to the central crosses of the wheels *g*, and to enter into circular grooves formed around those central crosses, in order to retain those wheels from sliding along their axis, except when the chain races are being adjusted on the cross rails, and then the said brackets will adjust the wheels *g, g*, correspondent to the adjustment of the chain races.

The axis *w*, of the wheels *g, g,* gives motion to the machine and may be turned by hand, by means of the winch or handle *z*, or by any other adequate power. At the other end of the frame, but not fixed to it, are two other similar chain wheels *h, h,* to which areattached spur wheels *i, i,* of rather larger diameter, which

work against the spur pinions *k, k,* to the inner sides of which are attached rollers or pulleys *k, k,* which are called the pricking pulleys, and which are situated over the chain wheels *h, h,* as shewn in figs. 6 and 8. The wheels *h, h,* are not both fixed on one axis, but each wheel with its spur wheel *i,* turns on a centre pin mounted on a bracket as hereinafter mentioned, as is also each of the pinions *k, k,* with its pricking pulley *k.* The centre pins for the wheels *h i, h i,* and *k k, k k,* are all supported by brackets *m, m,* with three arms, one of which is fastened to the outside of each of the chain races *b, c,* best seen in fig. 5, at the foremost end *b,* thereof; another of the arms reaches downwards to support the centre pins of the wheels *h,* and *i,* and the third arm extends upwards to bear the centre pin for the pinion *k,* and its pricking pulley *k,* seen in fig. 6. Two similar brackets *r,* fig. 6, are fixed to the inside of each of the chain races *b, c,* at the said end *b,* to bear the other end of the centre pin of the wheels *h,* and *i,* but these brackets *r,* are without the third arm extending upwards *l, l;* fig. 10, is a roller covered with a card of the sort commonly used in carding cotton, and its situation is indicated in fig. 6, by dotted lines.

An endless chain *o, o,* (which is made of brass) is applied on each pair of wheels *g,* and *h,* in grooves made in the face of each wheel, as shewn in figs. 6 and 7. This chain in its passage between the points *b,* and *d,* fig. 4, is carried through a chain race *b, c, d,* supported by bearers sliding in slots in the cross rails.

The outer surface of the chains is studded with pins, fig. 13, fixed at equal distances of about three quarters of an inch asunder, as shewn in fig. 11, which during the passage of the chains over the wheels when in work, enter into suitable holes in the face of the pricking pulleys

k, k, represented in fig. 8. At *c, c,* are joints or hinges in the chain races, in order that the ends *b, b,* of the chain races may be made to converge and diverge, and the wheels *h, h, i, i,* and *k, k,* and the pricking pulleys *k, k,* being attached by the brackets *m, m, r, r,* to the ends of the chain races converge and diverge together, with them; *e,* is a small handle wheel with spokes, the axis of which *f,* gives motion to the mitre wheels *f, f,* best seen in fig. 5, and thereby to the right and left hand screw *g,* shewn in fig. 9, which represents an upright view of the cross rail 1, seen in fig. 5. The bearers slide in slots in the cross rails, by means of the nuts which are fixed to the bearers, and pass through the slots, as seen in fig, 9, and which nuts are perforated by the right and left hand screw *g,* which in its revolutions work in its nuts and thereby increases or diminishes the distance, between the bearers and the foremost ends *b, b,* of the chain races, which are attached to them.

A similar apparatus may, if thought fit, be attached to the other cross rails, for the purpose of increasing or diminishing the distance between the bearers and chain races on them. Fig. 8, represents a lateral view of one of the chain wheels *h,* and the pricking pulley *k,* with a portion of the chain *o, o,* and its pins passing between them; the spur wheel *i,* and pinion *k,* are supposed to be removed in this representation. Fig. 11, represents the upper surface of three links of the chains; the black spots represent the holes in which the sharp pointed pins (see fig. 13) are to be screwed; the links are of two sorts, broad and narrow, placed alternately and connected by joints formed like those of hinges, and which project beyond the surfaces of the links, as is seen in figs. 4 and 8; the joints must be fitted rather loosely, so as to admit of sufficient lateral play in the chains for converging and diverging. The

grooves cut in the faces of the chain wheels leave of course raised edges on each side; notches are cut in these edges, as shewn in the figs. 6, 7, and 8, each notch being of a sufficient size to admit a broad link of the chain, and the two connecting hinges, and the distance between every two notches being equal to the length of one of the narrow links without the hinges. When therefore the chains are placed on the wheels, the broad links lie in the notches, whilst the narrow links lie between the raised edges, as shewn in fig. 8, and on the wheels *g, g,* being put in motion, the chains are propelled by the pressure of the raised edges of the wheels against the projecting joints of the broad links of the chains, whilst the wheels *h, h,* are carried round by a corresponding action of the chains against the raised edges of those wheels, and they, by the cog wheels *i, i,* best seen in fig. 6, turn the pinions *k.*

Figure 12, represents a cross section of the chain races *b, c, d,* and a cross section of a broad link of the chain is represented by dotted lines in its place within the chain race, with one of the pins; fig. 12, represents one of the pins, with its nut and screw complete; fig. 10, represents the card roller *l, l,* with pulleys *l, l,* fixed on at each end of its axis; over each of these pulleys a friction cord is placed, one of which is fastened to the frame of the machine, and from the other end I suspend weights in order to retard the motion of the roller as much as may be necessary, so as to bring the fabric to the pricking pulleys as tight and straight as possible.

To perform the operation of stretching by means of this machine, first adjust the chain races by sliding their bearers along the cross rails 2 and 3, and fastening them in their slots by suitable binding screws at such parts of the said cross rails as will place the parts *c, c,* and *d, d,* so far apart that the distance between the pins of the

respective chains may be equal to the breadth to which the selvages of the fabric are required to be finally stretched; then adjust and fasten the wheels *g, g,* at a corresponding distance on their axis *w,* so that the chains may pass from them to the chain races in a direct line; next adjust the ends *b, b,* of the chain races in like manner to the present or contracted breadth of the fabric.

The distance of the chain races at the ends *b, b,* are adjusted by means of the wheel *e,* and its connected apparatus before described, and the distance at the points *c, c,* and *d, d,* are generally adjusted by hand, but it may be done by the application of apparatus similar to that used to adjust the ends *b, b.* The chain races, when thus set, diverge from the points *b, b,* to the points *c, c,* and are parallel from *c, c,* to *d, d,* as seen in fig. 5.

When the fabric is to be stretched, it must be in a damp state. If it has been recently stiffened, or has undergone any similar operation, by which it has been thoroughly moistened, it may have retained sufficient moisture from such operation, but otherwise water is to be used for damping the fabric.

The fabric being thus wetted and being gathered upon a roller or otherwise, pass it over the card roller *l, l,* so as to bring the edges of the piece straight and evenly over the endless chain *o, o,* and beneath the pricking pulleys *k, k,* best seen in fig. 6, where I stick the end of each of the selvages on the pins of the chains at *b, b.* The chain wheels *g, g,* being then turned steadily round by the moving power applied in the direction indicated by the bent arrow in fig. 4, both the chains revolve, carrying forward with them the fabric, the selvages or edges of which are progressively fastened on the pins by the pricking pulleys *k, k,* forcing the selvages down on the pins as the chains move forward. The chains in their progress

with the fabric from *b, b,* to *c, c,* continue to diverge until at *c, c,* they attain their utmost intended separation equal to the required breadth of the piece, the fabric stretching as the chains to which its edges are fastened gradually diverge.

The chains with the fabric having passed the points of extreme divergence *c, c,* continue their progress at the same distance apart to the ends of the chain races *d, d,* thus retaining the fabric a sufficient time in its stretched state, to give permanence to the increased tension of the fabric, which is then taken off by hand or otherwise.

Note.—The overhanging borders at the upper sides of the chain races (best seen in fig. 12), along which the edges of the piece slide, and which are made very smooth to facilitate such sliding, should rise up, with inclined planes at the ends *d, d,* so as to raise up the edges of the piece above the level of the tops of the pins, in order to detach the said edges from their points.

In order that the fabric may retain more exactly the width obtained at the points *c, c,* heat may be applied to the surface or surfaces of the fabric, to dry it during its passage from *c, c,* to *d, d,* but the application of heat forms no part of my invention, and is therefore not claimed by me.

In order, if necessary to tighten the chains and make them work more truly, a tightning pulley pressed down by a weight, may be applied to bear upon the lower returning of each chain. The size and proportions of the different parts of this improved stretching machine, as well as the materials of which the parts of the machine are to be composed, may be varied at the discretion of the constructor, according to the descriptionof the cloth or fabric to be stretched by it.

Having now described the improved stretching machine, and explained the mode in which it is to be used, for extending pieces of calico or other fabrics of cloth in width, the Patentee says that he claims as his invention, the combined application of all the several parts in the way he has described, to form an improved stretching machine, for the purpose of stretching calico or other fabric of cloth in width, in the manner hereinbefore set forth, but I make no claim to any of the several parts in their individual characters, except as to the construction of the endless chains fig. 11, with their pins fig. 13; and the adjustable chain races, fig. 12, for receiving and guiding those chains, and also the construction, as hereinbefore described, of the pricking pulleys *k*, *k*, seen in figs. 6 and 8. which stick the selvages of the pieces upon the pins of the chain.—[*Inrolled in the Rolls, Chapel Office, October,* 1831.]

Specification drawn by the Patentee.

To Charles Cummerow, *of Lawrence Poultney Lane, Cannon Street, in the city of London, merchant, in consequence of a communication made to him by a certain foreigner residing abroad, for certain improvements in propelling vessels.*—[Sealed 10th Dec. 1828.]

The invention described in the Specification of the above Patent, is the application of a revolving horizontal propeller or paddle, formed by a sheet of thin metal, coiled once round a shaft in a helical or spiral curve, as the thread of a screw. This paddle or propeller is to be immersed underneath the water at the stern of a boat, in a horizontal position near the keel of the vessel; on

rotatory motion being given to the axle of the propeller, it is supposed that the coiled shape of the paddle will screw itself through the water, and cause the vessel to move forward.

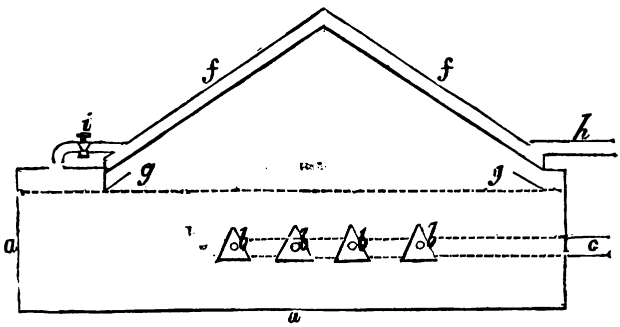
There is an elaborate description given in the Specification of this invention, but its want of novelty is so obvious, that it is not necessary for us to say more upon the subject.—[*Inrolled in the Inrolment Office, June,* 1829.]

To WILLIAM FURNIVAL, *of Wharton, in the county of Chester, Esq. for his invention of certain improvements in evaporating brine.*—Sealed 21st February, 1831.]

THE invention specified under this Patent relates in the first place, to an improvement or an invention patented by Joseph Tilt, 4th April, 1827, for "certain improvements in the boilers used for making salt, commonly called salt pans, and in the mode of applying heat to brine;" a report of the specification of his patent will be found in Vol. II, Page 283, Second Series of this Journal; and which Letters Patent, and all liberties, rights, and privileges thereby granted, have been assigned by Mr. Tilt to the present Patentee, as it is stated in his Specification.

The improvement on the invention of Mr. Tilt consists in placing angular pipes or tubes within salt pans in such manner, that there is a space left beneath them for the deposit of the crystals of salt as they are formed, and which are allowed to descend on to the bottom of such salt pans. The upper surfaces of the angular pipes or tubes, permit the crystals of salt to roll off them in

the same manner as the angular roofs, described by Mr. Tilt in his Specification. The second part of this invention, consists in forming the cover of a salt pan double, to contain brine in it, which brine will receive the heat from the steam, which is evaporated from the brine contained in the salt pan; but the brine contained in the double cover is not permitted to evaporate until it is drawn off into the salt pan, whereby crystallization is prevented within the double cover.



The above figure is a transverse section of a salt-pan with these improvements adapted to it; *a, a, a,* is the salt-pan, having four angular tubes or pipes *b, b, b, b,* extending from end to end; these tubes or pipes are connected together at one end by short pipes to a main steam pipe *c, c,* on the outside of the pan; this pipe conducts steam from a boiler to the angular tubes *b, b, b, b,* for the purpose of heating and evaporating the brine contained in the salt-pan *a, a.* To the ends of these angular tubes there are also affixed cocks or valves to permit the escape of the air, or the entering of the steam from the main-pipe *c,* and the condensed steam may be drawn off from the angular tubes by small pipes.

In working the pan with this improvement the crystals of salt are to be removed from time to time from off the bottom of the salt-pan, by scraping underneath the angular pipes, and drawing the crystals of salt to the sides of the pan, and removing them by skimmers or perforated shovels in the usual way.

The second improvement is also shewn in the figure, and consists of the double cover *f*, *f*, which from its peculiar construction has a larger surface for condensation, and conveys the condensed steam away, without permitting it to fall back again into the brine in the pan, thus possessing advantages over other angular or curved covers.

The double cover is placed over and extends from end to end of the salt pan, by which means the steam as it rises from the brine, condenses on its under surface, and gives out its heat to the brine contained within it, until it becomes condensed, when it runs down the under surface, and is collected in the troughs *g*, *g*, formed on each side to receive and convey it away, without permitting it to fall into the brine; *h*, is a pipe for supplying brine to the double cover *f*, from a reservoir, which will cause it to be kept continually full of brine, and at the same time will not allow it to evaporate, until it is drawn off into the salt pipes by the press and cock *i*, whereby the brine does not crystallize within the cover; the brine heated in the cover is to be drawn off into the salt pan, from time to time in the same rate as is found to take place in the evaporation.

The Patentee states in conclusion, that having described the nature of his improvements, and the manner of carrying the same into effect, he wishes to observe that although he has shewn and described only four angular pipes or tubes *b*, yet he does not confine uimself to that number

nor to the angle shewn in his drawings, as the same may be varied, care being observed that they are constructed so that the crystals will not lodge as they are formed on their upper surfaces, but descend into the brine to the bottom of the pan.

The angular pipes or tubes the Patentee prefers to be made of copper, sufficiently strong to bear the pressure of the steam used for heating, yet he does not confine himself to the use of that metal, and that the angular pipes or tubes may have furnaces or fire places formed in them, as described in specification of Joseph Tilt. In constructing the double cover, he usually forms the same of iron or copper, in one continuous chamber, but it may be constructed in separate compartments, either running longitudinally or the reverse.

And he claims as his invention :—" first, the placing of angular pipes or tubes in salt pans, in the manner above described, for evaporating the brine, such angular pipes or tubes being above the bottom of the salt pans, and consequently having brine beneath them. Secondly, he claims the placing of a double cover over the surface of the brine undergoing evaporation, such double cover being filled with brine, to be heated by the steam arising from the salt pan, but the brine contained in the double cover, not being permitted to evaporate till it is drawn off into the salt pan, whereby the brine is prevented forming into crystals within the cover as above described. —[*Inrolled in the Petty Bag Office, August,* 1831.]

To William Sumner, *of Hose, in the county of Leicester, lace-maker, for his having invented or found out certain improvements in machinery for making lace, commonly called bobbin-net.*—[Sealed Feb. 6, 1831.]

These improvements consist in the construction of certain novel pieces of mechanism, and their adaptation to that part icular kind of machinery for making lace, known by the name of the Lever's machine. The object of these improvements is to enable the Lever's machine to make that peculiar sort of lace which is denominated in the trade fancy net, or bullet rolling, arranged in various patterns.

These improvements may be described under three general heads—first, a mode of shogging or shifting laterally at intervals certain portions of the combs, by means of an indented wheel, acting against a sliding bar, on which these shifting portions of the combs are mounted. Secondly, a mode of shifting or shogging laterally certain of the pushers at intervals, corresponding with the movements of the combs above mentioned, in order to bring the said pushers into or out of action at those times; and, thirdly, the adaptation of a tappet or cam wheel, to shog or shift the point bar, in accordance with the other movements.

The operation of some of these parts very closely resembles the ordinary mode of forming selvages between the narrow stripes of lace called breadths when made in a Lever's machine, except that, instead of the long spaces between the selvages, which are connected together by a zigzag thread, the movements of the machinery, about to be described, cause the thread to traverse and occasionally to close the spaces forming the open parts of the net into circular holes.

The movements of the bobbins to produce the breadth, or series of narrow stripes, in one sheet, with distinct selvage on each strip are called *turnagains* (a term and operation well understood by lace-makers in general).

In plate IX, fig. 7, is an elevation of a machine for making lace, constructed on the Lever's principle; the general appearance of the front of the machine is here shewn, though some of its minor parts are omitted, and they are exhibited in the situations in which they are to be placed in the machine; *a, a,* is the warp roller; *b, b,* the work roller; *c, c,* the front point bar; *d, d,* the front pusher bar, on the top of which lies an auxiliary pusher bar *e, e*; on this bar *e, e,* are mounted a series of extra pushers to be occasionally brought into operation, as will be explained hereafter; *f, f, f,* is the bar carrying the extra combs to effect the turnagains; *g, g,* is a rod affixed to the turnagain comb bar, the extremity of which is acted upon by a horizontal wheel *h,* having indentations in its periphery. This wheel *h,* is mounted upon a perpendicular shaft, carrying a cog-wheel *i*; this cog-wheel, and consequently the shaft and the wheel *h,* is driven by a pinion upon the shaft *j,* which shaft is the axle of the Dawson's wheel; this shaft *j,* is to be actuated by a click as usual. The extra comb bar *f,* is kept stationary as long as the outer extremity of the rod *g,* works against the circular part of the periphery of the wheel *h*; but as that wheel revolves whenever one of the recesses or indulations in its periphery comes opposite to the outer extremity of ice rod *g,* the rod is allowed to slide to the right, and will then be drawn outwards a short distance by the force of a vertical spring, by which movement of the bar *f,* the extra combs are shogged or shifted one gate to the right hand, and on the circular part of the wheel *h,* coming round and acting again upon the end of the rod *g,* the bar is then

shogged or shifted to the left back into its former situation.

The auxiliary pusher bar *e,* is kept stationary by means of a projecting arm *k,* fixed to that bar, carrying a tooth at its upper end, and the point of which tooth acts against the perphery of a small wheel *l,* and is drawn up to its bearing by a helical spring attached at the bar *e,* and at the other end to the stationary frame. This wheel *l,* is mounted on a carriage fixed to the front pusher bar, and has certain indulations or recesses cut in its periphery, and as the wheel being made to revolve whenever one of these recesses comes opposite to the tooth *k,* the bar *e,* is allowed to slide to the left, and being drawn by the helical spring shoggs or shifts the extra pusher at that time, so as to bring them to act upon those bobbin carriages which have, by the shifting of the bar *f,* been brought into the previously vacant spaces at the turnagains.

The small wheel *l,* is made to turn upon its axis by the following means:—

Upon an axle mounted in a carriage fixed upon the front piston bar alongside of the wheel *l,* is a small ratchet wheel *m,* in the underside of which ratchet two pins are are fixed; these pins, when the ratchet goes round, successively take into the teeth of another small ratchet wheel *n,* upon the axle of *l,* and consequently every rotation of the wheel *m,* drives the ratchet *n,* two teeth, and also the wheel *l,* part of a rotation. A catch *o,* fixed to the front comb bar stands up sufficiently high to meet the teeth of the ratchet wheel *m,* every time that the pusher bar *d,* which carries these wheels is raised, consequently by the opening and closing of the machine in the ordinary course of working, at every stroke of the handles the ratchet wheel *m,* is made to strike against the catch *o,* which drives it one tooth, and thus after a certain number

of successive beats of the machine, the wheel *l*, being driven round one of its recesses, comes opposite to the tooth *k*, and allows the extra pusher bar *e*, to shog or shift in the manner already described. As it is necessary to keep back the front pusher bar *d*, and prevent the pusher going in among the carriages, where the carriages in the fancy bar *f*, have to shog at the turnagains, I have introduced a small wheel *p*, with two notches in its edge, against the circular part of the periphery of which wheel, a tooth *q*, is intended to act; this tooth *q*, extends inwards from an arm affixed to the front pusher bar, and consequently the pusher bar is, while the tooth bears against the circular part of this wheel *p*, kept back until one of its notches comes opposite the tooth. The wheel *p*, is driven round by a stationary click *r*, taking into the teeth of a small wheel *s*, fixed on the same axle as *p*. The stationary click *r*, is fixed by an arm to the standard of the machine, and the ratchet *s*, and wheel *p*, are mounted upon the front landing bar, hence every time that the machine opens, that is, the front bars raise the click *r*, drives the ratchet *s*, one tooth, and one of the notches of the wheel *p*, is thereby brought at the proper times opposite the tooth *q*, and the pushers then go in and act upon the carriages as usual.

Fig. 8 is a section perpendicularly through the machine in a transverse direction, in which the situation of the extra pusher bars *e*, *e*, are shewn with the wheels *l*, and *n*, and tooth *k*, which are the same in construction and situation at the back of the machine, as I have described in reference to the front.

In order to shog one of the point bars, and bring it into corresponding action with the movements of the combs and pushers already described for the purpose of forming the bullet-holes, a small cam or tappet wheel *v*,

is mounted in a carriage attached to the back point bar shaft, towards the left end of the machine, which cam or tappet as it revolves acts against a tooth *u*, at the end of the sliding joint of the back point bar and shogs it to the right once in every rotation, the bar being brought back again by a helical spring. This cam or tappet wheel *v*, is driven round by a ratchet-wheel upon its axle, striking against a stationary click *w*, attached to the frame, which ratchet is driven one tooth every time that the back point bar descends for to take up the half mesh.

When I wish to produce an arrangement of the bullet-holes in the net in zig-zag directions, or in any other form across the net, deviating from straight perpendicular ranges, I attach a horizontal wheel *x*, to the upper part of the perpendicular shape which carries the wheels *h* and *i*; the periphery of this wheel *x*, I cut into induta-tions for the purpose of working the bolt *y*, which is connected to and drives the comb bar as in ordinary machines; but by means of the indutations on the periphery of this wheel *x*, the comb bar is occasionally traversed to arrange the pattern or direction of the bullet-holes.

The Patentee observes that as it is impracticable in this specification to contemplate every variety of pattern of bullet holing, which might be made in lace upon this improved machine, so it is unnecessary to point out all the variations in the indentations which the shogging wheels would require to produce such different patterns, as any competent lace maker will perceive in what manner and order to make the indentations and elevations on the peripheries of the several wheels *h*, *l p*, *r*, and *x*, and what number of teeth to give to the several driving toothed or ratchet wheels, which will depend upon the size of the pattern.

The specification concludes by saying—Having described the construction of my improvement and the manner of their adaptation to a Lever's Machine, I lastly desire it to be observed, that I do not intend to confine myself to the precise situations, dimensions, or forms of the new parts as exhibited in the drawings, knowing that they may be slightly varied and still retain the same operative effects, but I rest my claim of invention to the employment of auxiliary pusher bars, and to the shogging of the said bars, and also the shogging of the extra comb bar and point bar, by means of cams or wheels, with indentations for the purpose of shifting the situations at the turn-agains, and causing them to change their traverse occasionally and not continually as in making breadths, and thereby with the assistance of shogging, the print bar to form that description of fancy or ornamental net having circular interstices called bullet holing.—[*Inrolled in the Rolls Chapel Office, August,* 1831.]

Specifieation drawn by Messrs. Newton and Berry.

On the Friction and Resistance of Fluids. *By* George Rennie, *Esq. V. P. R. S.*

Read before the Royal Society, June, 1831.

When on a former occasion I communicated the results of a series of experiments on the Friction and Resistance of the Surfaces of Solids (Philosophical Transactions for 1828), I stated that they formed part only of a series of experiments on the nature of friction generally. My object at first was to trace the relation subsisting between the retardation produced by the surfaces of solids in motion when in contact with each other and with fluids; but finding that the subject connected with either of these branches was sufficiently extensive, I deemed it necessary to postpone the second part of the inquiry to a future occasion. Those experiments, however, established some important facts. They showed that (within the limits of abrasion) friction was the same for all solids, and that it was neither affected by surface nor

velocity, Subsequent experiments upon rolling bodies of great weight and magnitude, when the resistance was reduced one thousandth part of the mass, and the surfaces in the ratio of thirteen to one, have corroborated the affinity of resistance between rolling and sliding bodies. Thus in connecting and continuing the isolated experiments of Coulomb and Vince, and assigning values to the abrasive resistances of most of the most useful solids, a considerable advance has been made in the science.

The subject of the present paper, however, involves difficulties of a more complicated kind. The theory of solids as deduced from the laws of mechanics, and independent of experiment, may be applied to any system of bodies; but the theory of fluids, in which the form and the disposition of the particles, or the laws of their action, are unknown, must necessarily be founded on experiment; and even with this aid, which can only be obtained through the intervention of a solid, our knowledge of the true properties of fluids must be vague and uncertain. Accordingly we find that the subject of fluids attracted the attention of some of the most distinguished mathematicians and philosophers of Europe for the last two centuries; that is, from the year 1628, when Castelli first published his Treatise on the Measure of running Water, down to the hydraulic investigations of Eytelwein and Young. Between these periods, Italy, France, Germany and England, added their contributions to the sciênce. But it is to the Italians principally that we owe the foundation of it, in their numerous investigations and controversies on the rivers of Italy; hence the writings of Castelli, Viviani, Zendrini, Manfredi, Polini, Frisi, Gulielmini, Lechi, Michellotti, and of many others.

Each of them has endeavoured to establish a theory applicable to rivers and torrents, but in general wlth indifferent success. The science again received fresh accessions from the more valuable investigations of Bossut, Dubuat, Venturi, Funck, Brunning, Bidone, Coulomb, Prony, Eytelwein and Girard; and among our own countrymen, of M'Claurin, Vince, Matthew Young, Dr. Jurin, Professor Robinson, and the late Dr. Thomas Young. Sir Isaac Newton had already demonstrated, in his celebrated propositions 51, 52, and 53 of the Principia, (in the case of a cylinder in motion immersed in a fluid,) that the resistance arising from the want of a perfect lubricity in fluids is (cæteris paribus) proportional to the velocity with which the parts of a fluid separated from each other; and that, if a solid cylinder of infinite length revolves with a uniform motion round a fixed axis, in a uniform and infinite fluid, the periodical times of the parts of the fluid thus put in motion will be proportional to their distances from the axis. This theory (although conformable to experiment) was objected to by Bernoulli and D'Alembert, on the

ground that Sir Isaac Newton had not taken into consideration the centrifugal force or friction arising from the pressure of the concentric rings or filaments round the cylinder, the fluid being supposed in a state of permanence, and the friction of the rings equal throughout.

Pitot (1728), in his experiments on the water-works at Marly and Versailles, was the first to demonstrate with equal velocities, and in the ratio of the volume of water, the friction of water in pipes was in the inverse ratio of their diameters; and Couplet (1733), Marriotte, and Deparcieux, estimated the difference between the real and calculated expenditures of glass tubes and pipes.

Chezy (in 1771 and 1786) was the first engineer who endeavoured to establish the relation subsisting between the inclination of an aqueduct and the transverse section of the volume of water it ought to carry,—on the supposition that the accelerating force, due to the inclination of the bed of the conduit, is counterbalanced by the resistances of the channel in the ratio of the surface, and increasing in proportion to the square of the velocity. What Chezy had remarked was concluded by Bossut, who cleared the investigation of most of its difficulties, and demonstrated it to be in accordance with theory. He found that small orifices discharged less water in proportion than great ones on account of friction; that the vena contracta, and consequent expenditure, diminished with the height of the reservoir; he pointed out the law by which the discharge diminishes according to the inclination and number of bends in a pipe, and the influence of friction in retarding the velocity of waters moving in canals and pipes, in which he made the square of the velocity to be in the inverse ratio of the length of the pipe; he determined the co-efficients by experiment, and thus obtained a formula expressive of the conditions of the uniform motion of water in open canals. The greater part of these hypotheses may be said to have been removed by the more extensive researches of Dubuat. His great hydraulic work, published in 1779 and 1786, contains a series of the most valuable observations, whose results accord very nearly with the new formula of the motion of water in pipes and open conduits; and his experiments, with pipes inclined in various angles from the 40,000th part of a right angle to 90 degrees, and in channels which varied from a line and a half in diameter to areas of seven or eight square toises, seem to comprehend every case of inclination; so that by collecting a prodigious number of facts, both with compressible and incompressible fluids, he obtained a general expression for all cases relative to the friction and cohesion of fluids: but a logarithmic function which he introduces in it, by a sort of approximation, gives it a character of uncer-

tainty, which restrains its use, and shows the necessity of fresh researches. Ventruri, in 1798, " Sur la Communication latérale du Mouvements dans les Fluides," repeated acd added many new facts to the experiments of Bossut, on the expenditure of differently shaped orifices and tubes, but particularly on the lateral communication of motion by the cohesion of fluids. Coulomb first approximated to the solution of the question, by a very ingenious apparatus, consisting of discs of different sizes, fixed by their centres to the lower extremity of a brass wire, and made to oscillate in fluids by the force of torsion only; he concluded that the resistance was a function, composed of two terms, one proportional to the first, the other to the second powers of the resistance: again, that it was not sensibly increased by increasing the height of the fluid, but simply by the cohesion of the particles of the fluid which presented greater or less resistance, in proportion to the viscidity of the fluid, oil being to water in the ratio of 17.5 to 1. But whatever might be the conclusions of Coulomb, it is obvious that both the size and constructian of his apparatus were ill calculated to produce results whereon to found a satisfactory theory; and accordingly both Messrs. Prony and Girard, in expressing their formulæ of resistanc, have not admitted that of Coulomb, but have adopted the mean of the best of experiments made by other authors: but as these formulæ give only the mean velocity, which is much greater than the velocity (of the fluid contiguous to the pipe) which ought alone to enter into the expression of the retarding force, it follows that the co-efficients deduced from the mean of all the experiments adopted by these gentlemen, have a value greatly inferior to the motion of the fluid contiguous to the side of the pipe or conduit. To ascertain correctly the value of this kind of resistance, M. Girard (vide les Mémoires des Scavans etrangers for 1815), undertook a prodigious number of experiments on tubes of different diameters and length, from which he deduced that the retardation is as the velocity simple. The effects of temperature are very remarkable: if the velocity be expressed by 10, when the temperature is 0° centigrade thermometer, the velocity will be 42°, or increased four times when the temperature is 85°: these values must be deemed approximations only.

The contributions of British philosophers towards the improvement of this science have been, unfortunately, scanty; for, with the exception of Sir Isaac Newton (who led the way), Dr. Jurin, Dr. Matthew Young, Dr. Desaguliers, Dr. Vince, Mr. Smeaton, Mr. Banks, and the late Dr. Thomas Young, (see the paper of the latter gentleman in the Philosophical Transactions, and his commentaries on Eytelwein's experiments), we can scarcely find any experiments on the subject; whatever has been effected by our

engineers or scientific men, has either been withheld from the public, or consigned to obscurity; and though we have tracts of marshes and fen land, consisting of many thousand acres, the dissertations on the mode of draining and carrying off their superfluous waters are confined to local pamphlets and reports, of comparatively minor interest to the science of hydraulics.

From the foregoing short but imperfect history, it is obvious that much has been done towards perfeeting this science. It is however certain, that much yet remains to be accomplished; and although we are deeply indebted to both the French and English philosophers for their extensive investigations on the laws of capillary attraction, the descents of globes in fluids, and the adhesion of fluids to metal discs, the phenomena of fluidity, and the laws which govern the motion and equilibrium of their particles, must yet remain a problem purely geometrical; and as we posscss no tangible means of approximating to the solution of the problem, but through the intervention of a solid, we must content ourselves, in like manner, with the imperfect formulæ deduced from experiments made on a small scale on the friction and adhesion of water in pipes and conduits, until we can ascertaiu more correctly the causes of the retardations of rivers as they accur in nature.

LITERARY AND SCIENTIFIC MISCELLANY.

Druidical Remains. A few days ago Mr. Cole of Scarborough discovered in the vicinity of the village of Cloughton, a druidical circle, near to the one pointed out by John Wharton, Esq., a few weeks since. It is about twelve yards in diameter, having the altar stone remaining, and is in a direction bearing N.N.E. from the Wharton circle. Its site is in a vale, called Hulley's Hack, and near it flows a clear spring of water. It is bounded by the plantation nominated Lind Ridge or Rigs, on the opposite elevation.

Highland Scenery. An extensive pictorial and trigonometrical survey of the Highlands and islands of Scotland has been commenced this year by Lieutenant Colonel Murray, who has already traversed a large portion of the West Highlands.

APPENDIX

To the Report of the Select Committee of the House of Commons, on Patents.

Papers delivered in by John Farey, Esq.

[*British Law of Patents for Inventions.*]

(Continued from page 108.)

THE specification, after describing the stove, thus claimed as the invention, " that the fuel necessary for supplying the fire, shall be introduced at the lower part of the grate, in a perpendicular or oblique direction; as to the manner of performing it, that is set forth in the description and drawings.

It was proved that grates for cooking had been made before, with moveable bottoms, to be raised up by racks and pinions, and with doors to shut against the front bars, so as to conceal the fire; but those were schemes to contract or enlarge the depth of the fire-grate, according to the size of the meat to be roasted; and the doors were to shut in the heat for cooking, when the fire was not required for roasting; it was never thought, or intended, to use the doors to form chambers, which would contain a supply of fuel, that could be introduced into the fire places from below upwards.

Lord Ellenborough was of opinion, that the principle on which those grates were constructed, was identical with the concluding terms of the specification; that the patentee, by thus summing up the extent of his invention, had confined himself to that principle, which was not new; and therefore the patent could not be supported, although the application of the principle, as described in the specification, might be new. The patent was ordered to be cancelled, and repealed

Bovill against Moore and others. An action brought by direction of the Lord Chancellor, for Infringement of Brown's Patent of 1811 (assigned to Bovill), for " a machine for the manufacture of Bobbin Lace or Twist Net, resembling Buckinghamshire Lace, as made by hand, with Bobbin on Pillows." Tried in the Common Pleas, 1st March 1816, before Lord Chief Justice Gibbs. Verdict against the Patentee.

The machine was for making several narrow breadths of Lace, side by side. The fabric of real Buckinghamshire lace requires two systems of threads, like the warp and weft in cloth; the longitudinal threads extend lengthways of the piece, and intertwist

with diagonal threads, which latter traverse the breadth obliquely, from edge to edge, and then return with an opposite obliquity, whereby the different diagonal threads, which are so traversing in opposite directions, cross each other, and their intersections form the tops and bottoms of the hexagonal meshes of the lace; the sides of those meshes being formed by the inter-twisting of the diagonal threads, with the longitudinal threads.

All the varieties of lace that could be made by machines founded upon Morris's patent of 1764, were only imitations, by knitting-work, without any diagonal threads or twisting, which are essential conditions to make lace, which will retain the figure of its meshes after washing.

The first successful machine for making the real twist lace, was Heathcoat's patent of 1809; he warped the longitudinal threads on a roller, and wound up the lace on another roller, as fast as it was made, as the warp is wound in a loom for weaving cloth, only the warp stood in a vertical plane; the weft was supplied by a very different principle from common weaving; for in lieu of a shuttle, each of the diagonal threads was wound upon a separate thin flat bobbin, shaped like the sheave of a pulley, and about the size of a shilling; they were all placed in a row, side by side, in proper carriages, without touching each other, thus forming as many distinct shuttles as there were threads in the warp. In the operation, the row of bobbins was put through the spaces between the upright warp threads, penetrating through the plane of the warp from front to back, and after making a small lateral movement, the bobbins were returned again through that plane, or between the vertical warp threads, from back to front; each bobbin, in so doing, passed and returned at the opposite sides of its corresponding warp thread; and by repeating that manipulation, each bobbin thread became twisted around each warp thread, so as to make the sides of a row of hexagonal meshes. The twisting being done, the bobbins were arranged in a new order in their row, by passing each one round to the other side of its neighbour, by moving sufficiently sideways. This evolution effected the mutual crossings of the diagonal threads, each one crossing over the adjoining one, so as to make the tops and bottoms of the row of hexagonal meshes. A correct shape was then given to that row of meshes, by inserting a row of pins into them, to keep them open to the proper size, whilst a succeeding row of meshes was formed, as before; by first twisting the longitudinal threads with the adjacent diagonal threads, then crossing the adjacent diagonal threads over each other, and then inserting another row of pins, to give shape to the meshes so formed.

Heathcoat's machine was applied to make wide pieces of lace net, but it was also capable of making a row of distinct breadths,

by some modifications in that evolution, whereby the bobbins were new arranged in their row, in order to effect the crossing of the diagonal threads. That was a subsequent improvement.

Brown's machine, which was began after Heathcoat's was in use, was expressly intended to make breadths of lace; it reversed and inverted Heathcoat's system of working; thus the threads wound on the distinct bobbins, formed the longitudinal threads in the lace, and the threads warped on the roller, were the diagonal threads. This variation occasioned such changes in all the mechanical movements of the machine, as rendered it very different from Heathcoat's, and its position was also inverted; but Brown adopted Heathcoat's principle of having one-half of the threads on distinct bobbins, arranged in a row, so as to pass and repass between the warp threads, in order to effect the twisting of those two sorts of threads together. The crossing of the upright warp threads, each one over its neighbour, was effected in Brown's, by a piece of machinery which had been invented by Morris in 1781, in an attempted machine, which failed for want of introducing diagonal threads; but Brown, in adopting Morris's abortive contrivance, added a new one of his own, which caused the warp threads, after being so crossed, to continue to traverse obliquely all across the breadth in opposite directions, and to return, on arriving at the edges; that was effected by giving the horizontal roller on which the threads were warped, an additional rotatory motion, about an imaginary centre, at the middle of its length, so that the two ends of the roller went round in a horizontal circle.

Brown's specification had many drawings, which described all the separate parts of which the machine was composed, and also represented the whole machine put together, but it was difficult to understand how some parts were to be put together in the machine, which was exceedingly complex. There was also an omission of the means which the patentee used, to cause the diagonal threads to return, when they arrived at the edges of each breadth; for, by following the specification literally, the diagonal threads of each breadth would have been carried obliquely onwards into the adjoining breadths, so as to entangle therewith. The specification did not point out any distinctive character of the invention, but said, "my invention consists as represented in the drawings," and then described all the parts of the machine.

The infringement of Brown's patent was proved by two engineers, who had been sent, by order of the Lord Chancellor, to examine defendant's machinery.

It was contended, that the circumstance of the warp threads from the roller, becoming diagonal, constituted a new invention; for in twisting the two sorts of threads together, the warp thread was enabled to be the actor, and the bobbin thread was acted upon;

and that thereby the lace was made with better selvages than Heathcoat's; that although Heathcoat had commenced law proceedings against Brown, for infringement of his patent of 1809, he had never ventured to come to a trial. On the other hand, it was contended, that the specification claimed the whole machine: when, in fact, the bobbins and their movements, by which the twisting was effected, were Heathcoat's, and also part of the machinery, by which the crossing was effected, was Morris's; also, that the specification was defective in instructions how to make the proper selvages, to the distinct breadths which was the great object of the patentee, and his only claim to superiority over Heathcoat's machine.

Lord Chief Justice Gibbs: The patentee must show that he has performed all the conditions upon which the privilege was granted to him, and particularly, that he has described the mode of manufacture, so as to enable any competent person to make it, after his term is expired. In his specification he is bound to confine himself to that which is his invention; and if he has exceeded the limit of what he has invented, and for which he is entitled to the sole privilege, though there may be no other objection to his patent, that will overturn it. According to this specification, whatever is contained in the drawings annexed to it, is claimed as new invention, and if it is all new, he is entitled to maintain an action against any one who shall practise any part of what is represented.

It is not disputed that the machine is new, as far as respects a certain part of the manufacture, nor that the machine is useful. The evidence is uniform, that with the exception of some slight difficulties, a workman of common skill would be able to make the machine, by applying a great deal of attention to it (which so complicated a machine, however described, must necessarily require), and bringing a competent degree of skill. The specification ought also to enable a workman to use the machine to the extent most beneficial, within the knowledge of the patentee at the time; without reserving to himself any more beneficial way of working. This specification does not point out certain precautions which are actually used, in all these machines, and without which there would be danger of the diagonal threads of each breadth, entangling with those of the adjoining breadth; but it appears that that entanglement might be corrected as it occurred, if the workmen exercised a competent degree of attention. If Mr. Brown has since discovered and applied an improvement for that purpose, his patent will not be affected by his using his own machine in that improved state, for he will have added to the original merit of his invention, the further merit of using it more beneficially. But if at the time when he obtained his patent he was apprised

of such more beneficial mode, and did not communicate it to the public, that would be a fraudulent concealment, which will render his patent void: it appears that no machines have been used by him, without such inprovement.

The evidence has shown, that the originality of the machine, is in the mode of obtaining the longitudinal threads from the distinct bobbins, and the diagonal threads from a warp roller, which roller, besides turning round on its own axis to allow the thread to unroll from off it, has another revolving motion, around the middle of its length; so that the two ends of the roller describe a horizontal circle, in order to disperse its threads diagonally over the breadth of the lace, in two sets, which traverse that breadth with opposite obliquities. But although the invention may be beneficial, and in that respect new, the specification will be bad, if it states him to have invented that which was known before, because that affects to give him a larger privilege, than could legally be granted to him. The novelty of the contrivance by which the warped threads are made diagonal, is admitted, excepting the machinery for crossing those threads, which was borrowed from Morris; but the evidence states, that all which precedes the operation of crossing the threads, had been previously practised, by substantially the same means, in Heathcoat's machine, the principle being the same in effect.

In the case of Boulton and Watt *v.* Bull, the infringement by Bull was an engine, which, on the first view, had not the least resemblance to Watt's, for the head was placed where the feet were looked for; but he had taken the principle, which acted as well one way upwards as the other; and when Bull's engine was set upright, it was exactly like Watt's. So Brown's machine makes lace at the bottom of the machine, by a downward operation, and Heathcoat's made lace at the top of the machine, by an upward operation, which must be considered as the same in point of invention. I think I may state, that all that precedes the crossing of the diagonal thr[illegible] is old, whereas he has stated it as part of his invention; and [illegible] that some of the parts by which those threads are crossed are old. Brown's patent ought to have been only for an improvement; and certainly his specification should have pointed out those parts which were of his invention, and to which alone his privilege applied. If a combination of parts, forming a certain portion of Brown's machine, existed before, and he took up his combinations at that point, and went on combining beyond that, he has no right to the former combinations, and his specification, claiming the whole machine as his invention, is bad. But if he had the merit of inventing the combination of all the parts from the beginning, his specification is good.

The jury thought the defect in the specification "might be in-

advertent, and not fraudulent;" the Judge observed, " if he knew it, and did not state it in his specification, he must answer for his inadvertence." They then found, that " the combination of the parts up to the crossing of the threads, is not new; that the threads then taking a new direction, which is the most valuable part to the plaintiff, is a new invention; but it is nothing more than an improvement."

On the 3d May 1816, a motion was made for a new trial, but it was refused.

Lord Chief Justice Gibbs: Some confusion has been made between a new machine for making lace, and making lace on a new method, by a machine partly old and partly new. The present patent grants the sole use of the machine, and whoever imitates it, either in part, or in the whole, is subject to an action from the patentee. If it had been a new invention from beginning to end, and Heathcoat had afterwards made the machine described in his specification of 1809, is there any doubt, but that such machine would have been an imitation of part of Brown's invention? The evidence proved that up to a certain point, Brown's was an imitation of Heathcoat's. The drawings to Brown's specification are divided into different sections, each containing a portion of the machine, in a different stage of the progress of making it; one of those sections contain the principle of distinct bobbins, to pass and repass between the perpendicular threads of the warp, in order to effect the twisting; it was proved that the whole of that section existed in Heathcoat's machine; and that a combination carried no farther than that, was a useful step of invention towards a complete machine.

Mr. Justice Dallas: The law is quite clear, that if an invention be only an addition to an old invention, the patent must be for that addition only; as in Jessop's case of a particular movement in a watch. The question is, whether Brown's machine be a new invention *in toto*, or from a certain point only. The witnesses said, that if Heathcoat's machine had been made after Brown's, it would have been an infringement on Brown's patent; such patent therefore, to the extent contended for, must be void.

Mr. Justice Park: The law was most correctly stated by his lordship to the jury; it is not new law; for in the King *v.* Else, Mr. Justice Buller held, that where the invention consisted of an addition, or improvement only, a patent for the whole machine was void. In the present case, the jury have found, that up to a certain point, the machine acts like the former one, and that the invention is only an improvement. The verdict was confirmed against the patentee.

Newbery against James and others in Chancery. An application to dissolve an Injunction previously issued, to restrain De-

fendants from making or selling, and from disclosing the composition of Fever Powders, for which Dr. James (grandfather of one of the defendants) had a Patent in 1747; also of the Analeptic Pills, for which no Patent had been obtained. Heard 27th March 1816, before Lord Eldon. Injunction dissolved.

Dr. James, the grandfather of defendant, made agreements with Mr. Newbery, the father of plaintiff, in 1747 and 1755, that Dr. James, his executors, &c. should exclusively prepare those medicines for Mr. Newbery, his executors, &c. who should have the exclusive sale. Those agreements were to continue for an indefinite time, and been acted upon till lately; when, in consequence of an alleged violation, an injunction was granted as to the sale only of the medicines; and this was an application to remove the injunction.

Lord Chancellor Eldon: "How can the specific performance of the agreements be decreed? If the composition of the medicines is a secret, how can this court enforce any order that it might make? If it is not a secret, what is the ground for interfering? The patent for the fever powder is long expired, and it is required to enforce an agreement, by which the parties (independently of that patent) covenanted not to sell the patent article, except through each others hands. The specification ought to enable all the world now to use the invention; and if the preparation of the analeptic pills were a secret, what signified an injunction? For unless a disclosure were made, the court possesses no means of determining, on any occasion, whether it had been violated or not. The party who comes to complain of a breach of injunction. must first show that it has been violated. The injunction must be dissolved; the defendants to keep an account of what they sell, whilst the right is tried at law."

Note.—It was a mis-statement to the court, that there had been no patent obtained for the Analeptic Pills; Dr. James had a patent for them in 1774; but the specification is not intelligibly worded.

Heathcoat ex parte in Chancery. An opposition to sealing a Patent to Lacy, for a machine for making Twist Lace or Bobbin Net, to be worked by Steam power; on the ground, that the proposed Patent did not require the Specification to be enrolled, until fifteen months after the date. Heard 25th July 1816, before Lord Eldon. Seal refused.

It was stated that the patentee intended to apply to parliament, as in Lee's case (53 Geo. III. c. 179) to withhold the specification from public inspection, in order that the invention might not be sent abroad, and that fifteen months was necessary to make that application to parliament.

The Lord Chancellor Eldon said he could not put the seal to a patent which allowed fifteen months for enrolling the specification; that indulgence had been rarely granted. Mr. Lee's was a very peculiar case, being thought a most important discovery, and in time of war. If the present could be made out to be as beneficial, it would be doubtful whether a secret specification would be allowed; for his lordship was of opinion, that the legislature would pause a long time before they passed such an act in future; and he would venture to say, Mr. Lacy would not procure one. He could not establish a new principle, merely to prevent the French from smuggling; nor put the great seal to such a patent, without seeing the specification, for it might turn out good for nothing. The patent could not pass without the responsibility of the great seal, and if he sealed it, he might be called upon to give an account in parliament, why he had extended to this individual a particular privilege, which is contrary to the general policy of the law. He could not, in justice to the King's subjects, seal this patent, merely because it was a manufacture which other countries might wish to get.

Note.—On this refusal, a new patent was made out, with six months for enrolling; it was sealed 30th September 1816. The invention was afterwards practised to a considerable extent, but did not succeed, and has been abandoned in favour of other machines having the same object.

Walker against Congreve in Chancery. An application for enforcing an Injunction previously issued against violating Walker's Patent of 1810, for Barrels for preserving and conveying Gunpowder. Heard 27th July 1816.

The Lord Chancellor Eldon said, "An injunction may be isued against violation of a patent which has been obtained with all the necessary forms, although on examination the patent may befound improper." Defendant might show reasons for dissolving the injunction, but was bound by it, whilst it was in force, and would commit a contempt in disobeying it. So an injunction might be issued against a public servant, who, as such, was not liable to the consequences of a private suit, and therefore an injunction ought not to have been issued; still the authority of the court must be respected, and the injunction dissolved by the court, not broken by the party against whom it issued. In cases of penalties for contempt, all alleviating circumstances were matters for consideration, and he would hear the case before deciding on the question of contempt.

From that hearing, it appeared very doubtful to his lordship whether the patent had really been infringed, or could be maintained; the powder-barrels made by defendant, which formed the

subject of complaint, being as much like some old ones, made years before, as they were like those described in the specification. His lordship said, that the injunction must be dissolved, and an account kept of the articles made by defendant, until the validity of the right could be tried at law. " The injunction had been granted upon the statement, that it was a new invention, and that the defendant, in addition to making barrels for the public service, had also supplied East India ships. After the injunction was made, it should have been observed, till dissolved by the court. I will treat government here as I would any other suitor of the court; andas there are grounds for believing the injunction violated, the defendant must pay the costs of this application."

List of Patents

Granted byt he French Government, from the 1*st of April to the* 30*th June* 1831.

(Continued from Vol. VII. page 356).

To Mr. Auguste Noverre, of Paris, additions to his 10 years patent for a kneading machine.
— Nicolas Houzeau Muiron, of Rheims, additions to his 10 years patent for a new method of transporting gas.
— Claude Compagnot, of Paris, for a method of rendering soles of shoes waterproof. 5 years.
———— Archbald, of London, for a new process of working cane juice to extract at once the crystallized particles. 15 years.
— Olivier Benoist, of Plailly, for an improved harrow with three wheels. 5 years.
— Robert Hicks, surgeon of London, for improvements and additions to his patent for baking bread.
— Thomas Ingram, of Leicester (represented in Paris by A. Perpigna, French and foreign patent agent, 28, Rue Neuve St. Augustin,) for improvements in the generation of coal-gas. 15 years.
— Henri Pape, piano-maker, of Paris, additions to his patent for improvements in the sounding-board of piano's.
— Jacques Wall, tinman, and Charles De Larcleye, engineer, of Paris, second improvement on the 10 years patent for a new lamp.

To Antoine Dominique Sisco, locksmith of Paris, fourth improvement on the five years patent taken out by him for an instrument called " monte ressort boite."
— Jean Tulien Josselin, laceman, of Paris, fourth improvement on his five years patent for a new kind of stays.
— Martial Betoulle, of Limoges, for a new instrument for measuring distances. 5 years.
— Charles Bèaumont, of Paris, for an apparatus called hydrostatic moderator. 5 years.
— Joseph Alexander Robert, of Paris, for improvements in fire-arms. 15 years.
— Pierre Louis Beauduceau Père, engineer, of Paris, for a new hydraulic wheel. 15 years.
— Jean Felix Renaud, dyer, of Lyons, for additions to his five years patent for an improved process of dying.
— Theophile David Frankfort, of Paris, for additions to his 15 years patent for a new method of laminating bronze.
— Louis Brunier, architect, of Paris, for additions to his 15 years patent for a *perpetual hydromotor*.
— Pierre François Delacroix, chemist, of Rouen, for a new kind of stove called by him " multiplicator." 10 years.
— André Etienne Trompette, of Paris, for a new method of hanging cabriolets. 10 years.
— Adrien Gustave Demilly, of Paris, for cast iron fire logs. 5 years.
— Bryan, Donkin, and Co. engineers, London, for improvements in making paper. 5 years.
— Charles Pierre Reusse Dolmenasse, of Páris, second improvement on the 10 years patent for a new kind of carriage called *impulsive*.
— Adrien Jean Pierre Thilouer, of Paris, for an improved machine for compressing coal-gas, 10 years.
— Christophe Matthieu de Dombarle, of Roville, for an apparatus for extracting the sugar from beet root. 15 years.
— Jean Claude Clare, engineer, of Sedan, for a new machine called *hydro-atmospherique*, applicable to various purposes. 10 years.
— Gilles Cyveyre, of Nimes, for a machine for spinning silk. 5 years.
— Constant Gouche, of Paris, for an economical blue. 5 years.
— Jean Claude Chabert, of Paris, for a new kind of stove. 5 years.
— Richefeu and Fleschelle, of Paris, for additions to their 15 years patent for a kneading machine.
— Couleaux, Ainé and Co. of Molsheim, for additions to their 10 years patent for improved coffee mills.
— Gilbert M. Aubergies, druggist, of Clermond Ferrand, for a machine for making grooved bricks. 5 years.

To Jean Louis Cabias, curate of Pontigny, for a new system of playing on the organ. 5 years.

— Louis Auguste Gautier, druggist, of Havre, for a new method of making beer. 5 years.

— Antoine Joseph Gros, of Paris, for improvements on his 10 years patent for paintings on horse-hair cloth.

— Gerard Frédéric Courboulis, of Vouziers, for a new method of teaching to read and spell correctly. 5 years.

— ——— Teandau, of Chalons, for additions to his 10 years patent for a machine applicable to all purposes of raising water and draining.

— Antoine Perpigna, of Paris, French and foreign patent agent, for an improved machinery applicable to looms. 5 years.

— George Harris, of London, for a new method of making ropes, sail cloth, &c. 15 years.

— James Milligan, of London, for a new method of purifying sugar. 15 years.

— Pierre Remi Duchesne, umbrella maker, for a new kind of umbrella. 5 years.

— Felix Joseph Klein, of Strarburg, for a new life preserving system. 15 years.

— Pierre Jean Guerin, of Paris, for a new kind of vehicle called *coupee cabriolet*. 5 years.

— Rabaud, Freres and Co. of Marseille. for an apparatus calculated to raise ships above water. 15 years.

— Verebint Freres, of Toulouse, for a new system of making bricks by machinery. 10 years.

— Joseph Saluon, engineer, of Paris, for a new system of navigation. 15 years.

— Marler François Gullaume, of Paris, for a new kind of flour mill. 10 years.

— André Lioret Fils, of Paris, for a cart for carrying fire wood and delivering it in the measure. 5 years.

— Charles Auguste Drousart, of Neuilly, for a new fabric called *philippoine*. 5 years.

— Isaac Adolphe Laborde, of Bourdeaux, for a new kind of transparent paper. 5 years.

— Ennemond Felissent, of Lyons, for additions to his 15 years patent for an apparatus for drying through the medium of hot air.

— Jean Baptiste Rochelines, of Montpellier, for a safety coach. 5 years.

— Jean Marie Vouret, of Louviers, for a rotary fulling machine. 10 years.

List of Patents

Granted by the French Government, from the 1st of July to the 30th of September.

To Mr. Claude Jaillet, Jun. of Lyons, for a third addition to his 15 years patent for making ornamented stuffs.
— Amedée Joseph Rindenhagen, for a new sort of military trunk. 10 years.
— Vincent Pluriose Triquet, of Paris, for improvements in the construction of pianos. 10 years.
— Durand and Co. dyers of Saint Tiert, for improvements on their 10 years patent for ornamenting all kind of silk or cotton stuffs.
— Ennemond Felissent, of Lyons, second addition to his patent for a system of dessication through the medium of heated air.
— James Milligan, of London, for an apparatus for regulating the temperature in generating steam. 15 years.
— Frederic Kalkbremer, of Paris, for a *hand-guide* to facilitate the study of the piano. 5 years.
— Touron and Co. for addition to their five years patent for painting on horse hair cloth.
— Jean Claude Chabert, and Louis Legus, of Paris, for a portable windmill. 10 years.
— Mr. Louis Honoré Boquet, of Series, for a mechanical inkstand of all shapes. 10 years.
— Charles Auguste Drousart, of Neuilly, for addittions to his five years patent, for a fabrick of his invention called *philippine*.
— Pierre Bollen, of Maisons, for additions to his five years patent, for a machine calculated to extract the fecula from potatoes.
— Christophe Joseph Mathieu de Dombasle, of Roville, for additions to his fifteen years patent, for extracting sugar from beet-root.
— Pierre Théodore Peqin, of Paris, for a machine for shelling corn and dry seeds, and making pearl barley.
— John Everth, of London, for a method of dividing the constituent parts of palm oil, and applying separately, 15 years.
— Thomas Lord Cochrane, of London, for an improved rotary steam engine. 15 years.
— Basile Duiel, of Lyons, for a new kind of stove for drying dyed silks, worsteds, &c. 10 years.

To William Newton, of London, civil engineer, (represented in Paris by A. Perpigna, French and foreign patent agent, Rue Neuve, St. Augustin, 28), for improvements in touch holes and primers, suitable to percussion guns, pistols, &c. 10 years.

— Auguste Courtel, engineer of Lyons, for a machine for craping silk, cotton, or worsted stuffs. 10 years.

— Francois Barnabeé Vouillemont, of Joiurille, for a cast iron plough. 10 years.

— André Jeaffram, of Tours, for a new hydraulic press. 5 years.

— Jean Boirin, of St. Etinne, for a new method of making gun barrels. 5 years.

— Adolphe Lamborton, of Marseille, for an improved pump. 5 years.

— Miles Berry, engineer, of London (represented in Paris by A. Perpigna), for an improved pedometer. 5 years.

— Louis Brumer, of Paris, for second improvement on his patent of fifteen years, for an hydraulic machine called *perpetual hydromotor.*

— Antoine Dominique Sirco, engineer, of Paris, fifth improvement on his five years patent, for an instrument called *monte-ressort-boite.*

— Charles Henri Storey, of Paris, for a sash window, proof against wind and rain. 10 years.

— Jean Térémie Pouillot, of Paris, for a method of combining combustible matters and making a fuel composite. 15 years.

— Pierre Isidore Rouen, of Paris, for an hydraulic lever to regulate the course and action of fluids. 10 years.

— George Choiry, of Paris, for a pedometer in the shape of a footstep, applicable to different kinds of carriages. 5 years.

— Abraham Emmanuel Jaccond, of Vienne, third improvement on his patent of 10 years for a new method of disposing wheels, pivots, &c. so as to retain the oil with which they are greased.

— Phillippe Aubin, of Paris, for a new process of making mosaic tiles. 5 years.

— Berard and Wilkinson, of Paris, for improvement on their 15 years patent for a new bobbin for spinning, drawing, and throwing silk.

— Philippe Taylor, of Paris, for improvement on the patent of 10 years, transferred to him by Macintosh for accelerating combustion.

— Antoine Moffateur, wheelwright, of Lyons, for a new system of raising water to the greatest heights. 5 years.

— Philibert Mousset, engineer, of Lyons, for an improved silk winder, 5 years.

— Louis Victor Antoine Sire, and Claude Antoine Joseph Girardot, of Vesoul, for an economical stove. 5 years.

To Freres Fertugiere, of Ans, for a new method of making iron, or leaden balls, by means of a cylindrical roller. 10 years.
— Louis Sebastien Lenormand, of Paris, for a new system of lamp. 10 years.
— ——— Ramgo, brothers, watchmakers, for improvements on the patent of Mr. Sorel, legally transferred to them, for a new kind of steam engine.
— Pierre Lieutard and Jean Joseph Ricard, of Var, for a new flour mill with conical grinding stones. 15 years.
— Nicolas Clement Desormes, engineer, of Paris, for substituting wood to charcoal in high temperature furnaces. 15 years.
— Henry Holdsworth, Jun. of Manchester, represented in Paris by M. Perpigna, French and foreign patent agent, for improvements in the means of working cotton, flax, silk, and other fibrous substances. 15 years.
— Philippe Taylor, of Paris, for a new system for measuring gas. 10 years.
— Joseph Gibson, of Lille, for a new system of making bobbinnet. 10 years.
— Jean Baptiste Marie Joseph de Lancey and Nicolas Charoy, of Paris, for a new musket, firing two shots with only one barrel. 5 years.
— Taillepered de la Garenne, of Paris, for a new engine called by him *vicissim aqua terre*. 5 years.
— Onesiphore Pecqueur, engineer, of Paris, second improvement on his patent for a kind of boiler for refining sugar.
— Pierre Louis Etienne Guilling, for improvement on his patent for an apparatus which regulates the length of silk skeins.
— Zuber and Co. peper manufacturers, of Rixheim, for improvement on their 15 years patent for making continual paper.
— Charles Auguste Lupé and Louis Joseph Salmon, of Paris, improvement on their 20 years patent for reviving animal charcoal.
— Pierre Marie Bernard Rolein, of Rochfort, for improvement on his 15 years patent for an improved lock.
— Urbani Sartoris, of Paris, for a new kind of boat, called by him cateau vanne. 15 years.
— Nicolas Houzeau Miuron, of Reims, for a new process of making metallic tubes. 5 years.
— Jean François Corna, of Havre, for a new marine clock, opeing aa a turn spit. 5 years.
— Andrew Marouy, for a new harrow with three wheels. 5 years.
— André Etienne Trompette, of Paris, for improvement on his ten years patent, for a new method of hanging the body of a cabriolet.
— Ferdinand Leopold John, of Paris, for steel mechanical legs. 5 years.

To Jean Forgues, engineer, of Bordeaux, for preserving houses from fir. 5 years.

— Heuri Sanford, engineer, of Paris, for a machine for straining and cleansing the pulp from which paper is made. 5 years.

— Hippolyte Raimond Deschamps, for a new oven for drying plumbs. 5 years.

— St. Hainslas Benard, of Vendome, for an improved stove, 5 yrs.

— Francois Antoine Kenck, of Paris, for a machine for making pin nails. 5 years.

— Joseh Marie Giodiulli, and Charles Louis Harel, of Paris, for a machanical apparatus, called by them Volant a Percussion. 5 years.

— Purre Antoine Burat, of Paris, for improvement on their ten years patent, for new trusses for ruptures

— Francois Armand Caron, of Paris, for improvement on his five vears patent, for an improved lamp.

— George Choing, of Paris, for improvement on his five years patent, for his distance measuring foot step.

— Charles Auguste Drousart, for second improvement on his five years patent, for a new fabrick called *philippine.*

— Joseph Alexander Robert, of Paris, for improvement on his 11 years patent, for a new kind of fire arms.

— Antoine Reini Polonieau, of Paris, for a new kind of bridge. 15 years.

— Jean Boivin, of St. Etienne, for improvement on his five years patent, for making gun barrels.

— Nicolas Clement Désormes, engineer, for improvement on his fifteen years patent, for using wood instead of charcoal, in high temperature furnaces.

— Ardaillon Bessy, and Co. for a process of making gun barrels by means of cylindrical rollers. 10 years.

— Antoine George, engineer, of Lyons, for improvement on his patent, for a thrashing and winnowing machine.

— Jacques Dominique Charles Garard, for second improvement on his ten years patent, for an apparatus for drawing and engraving, without any previous knowledge of drawing.

— Clauide Marie Arestide Francois, for a paper or silk globe, 5 years.

— Thomas Hall, of Havre. for a machine to make tree nails. 5 years.

New Patents Sealed, 1831.

To Joshua Bates, of Bishopsgate Street, in the city of London, gentleman, in consequence of a communication made to him by a certain foreigner residing abroad, for an invention of certain improvements in machinery or apparatus for roving, twisting, or spinning cotton, silk, wool, hemp, flax, or other fibrous substances. —Sealed 27th October, for Inrolment.—6 months.

To Sarah Guppy, of Tarway House, Clifton, near Bristol, widow, for her having found out and invented a method of applying and arranging certain articles, parts or pieces of cabinet work, upholstery, and other articles commonly, or frequently applied to bedsteads and hangings, and also others not hitherto so applied.—27th October.—2 months.

James Macdonald, of the University Club House, Pall Mall East, in the county of Middlesex, gentleman, in consequence of a communication made to him by a foreigner residing abroad, for a certain improvement or improvements in the construction of bridges made of iron, or other materials, which improvement or improvements are also appilicable to the construction of piers, rail roads, roofs, and other useful purposes.—31st October.—6th months.

To George Minter, of Princes Street, Soho, in the county of Middlesex, cabinet maker and upholsterer, for his having invented a fastening for dining tables, and other purposes.—9th November.—2 months.

To Thomas Brunton, of Park Square, Regent's Park, in the county of Middlesex, Esq. for his having found out or discovered a new application or adaptation of certain

apparatus for heating fluids or liquids, and generating steam for various useful purposes.—15th November.—6 months.

To Thomas Brunton, of Park Square, Regent's Park, in the county of Middlesex, Esq. and Thomas John Fuller, of the Commercial Road, Limehouse, in the county of Middlesex, civil engineer, for their having found out and invented an improvement or improvements on certain mechanical apparatus applicable to the raising of water, and other useful purposes.—15th November.—6 months.

To Arthur Howe Holdsworth, of Dartmouth, in the county of Devon, for his having invented improvements in the construction of rudders, and in the application of the same to certain desriptions of ships or vessels.—19th November.—6 months.

To David Selden, of Liverpool, in the county palatine of Lancaster, merchant, in consequence of a communication made to him by a certain foreigner residing abroad, for an invention of an improved carding and slubbing engine for wool, and other fibrous substances.—22nd November.—6 months,

CELESTIAL PHENOMENA, FOR DECEMBER, 1831.

D.	H.	M.	S.	
1	0	0	0	⊙ before the Clock 10 min. 55 sec.
1	6	0	0	♀ in conj. with ϑ in Oph
1	22	0	0	☿ in conj. with B in Oph
2	6	0	0	☾ in conj. with γ in Libra
3	19	48	0	Ecliptic conj. or ○ new m.
5	0	0	0	⊙ before the Clock 9 m. 20 sec.
5	11	0	0	☽ in conj. with 1 μ in Sag.
5	12	0	0	☽ in conj. with 2 μ in Sag.
5	20	0	0	♅ in conj. with ϑ in Caps.
6	14	0	0	☽ in conj. with π in Sag.
8	22	0	0	☽ in conj. with ♅ lon. 12. in Cap, ☽ lat. 12 N. ♅ lat. 40 S. diff. of lat. 52
9	11	0	0	☽ in conj. with ♃ long. 18, in Cap. ☽ lat. 26 S. ♃ lat. 56 S. diff. of lat. 30.
10	0	0	0	⊙ before the Clk. 7 m. 9 sec.
11	0	0	0	☿ in conj. with λ in Sag.
11	2	0	0	♀ in conj. with κ in Virgo
12	23	22	0	☽ in □ or first quarter
14	12	0	0	♂ in conj. with κ in Libra
15	0	0	0	⊙ before the Clock 4 min. 48 sec.
15	4	0	6	☿ in conj. with σ in Sag.
15	8	0	0	☽ in conj. with 2 ξ in Ceti
16	10	0	0	☽ in conj. with f in Taurus
17	5	0	0	☽ in conj. with γ in Taurus
17	6	0	0	☽ in conj. with 1 δ in Taurus
17	7	0	0	☾ in conj. with 2 δ in Taurus
18	12	0	0	♂ in conj. with λ in Libra
18	13	0	0	☿ in conj. with ψ in Sag.
18	17	10	0	Eclip. oppon. or ○ full m.
19	5	0	0	☾ in conj. with ν in Gemini
20	0	0	0	⊙ before the Clock 2 min.
21	9	0	0	☾ in conj. with δ in Cancer
22	1	6	0	⊙ enters Capricornus
22	18	0	0	♂ in conj. with 1 and 2 B in Scorpio
24	2	0	0	♄ Stationary with σ in Leo
24	2	0	0	☾ in conj. with ♄ long. 13 in Leo. ☾ lat. 2 38 N. ♄ lat. 1 54 N. diff. of lat. 44.
25	0	0	0	Clock before the ⊙ 8 sec.
25	12	10	0	☾ in □ last quarter
29	12	0	0	☾ in conj. with γ in Libra
30	0	0	0	Clock before the ⊙ 2 min. 26 sec.
30	17	0	0	♀ in conj. with 4 ξ in Libra

J. LEWTHWAITE

Rotherhithe.

The waxing moon ☽.—the waning moon ☾

THE

London

JOURNAL OF ARTS AND SCIENCES.

No. XLVI.

[SECOND SERIES.]

Recent Patents.

To JOHN BLACKWELL *and* THOMAS ALCOCK, *both of Claines, in the county of Worcester, machine makers and bobbin-net manufacturers, for their having invented or found out certain improvements in machines or machinery for making lace, commonly called bobbin-net.*—[Sealed 13th January, 1831.]

THESE improvements apply to that particular kind or construction of machinery for making lace, commonly called or known by the name of the *Lever's principle,* which machines are by the Patentees intended to be worked by the agency of a revolving shaft, driven by the hands of the workman, or by any other suitable rotatory power.

The improvements consist in the following contrivances, (viz.) first, a new method of working the landing bars of the machine, by means of certain vibrating levers, and connecting rods actuated by a revolving cam, or excentric roller; or, a sort of zigzag or excentric groove, formed in the face of a wheel or

revolving plate: and, secondly, a new method of working the dividing bars or pusher bars, by means of compound levers on the lazy tongs principle, which are actuated by a revolving cam, connected to the driving part of the machine. These objects will be fully understood by every person conversant with the construction and operation of the *Lever's Machines.*

To render these contrivances perfectly evident, the Patentees have subjoined drawings to their specification, exhibiting their inventions in several figures, shewing the connection of the new and the old parts, and the manner in which they act together.

Plate VIII. fig. 1, is the right hand end elevation of a Lever's machine, with the improvements adapted thereto. Fig. 2, is a vertical section, taken transversely through the machine, at about two feet from the right hand end.

The several letters of reference indicating the same parts of the machine in all the figures; *a, a,* are two short axles, mounted on standards on the front parts of the wood frame, towards the end of the machine; to these axles, which are concentric with each other, the driving handle is attached, and by the rotation of these short axles, all the movements of the machine are effected. At the outer extremity of each of the short axles, *a, a,* a toothed wheel, *b, b,* is affixed; which respectively take into larger toothed wheels, *c, c,* upon the ends of the main shaft *d, d*; this axle *d,* extends horizontally along the whole length of the machine; it is therefore by the connection of this toothed gear that this main shaft is driven.

Towards the right hand end of the main shaft, near its extremity, the wheel *e,* with the excentric or zigzag groove is affixed, for the purpose of working the landing bars as above said. This wheel is best seen in the end view, fig. 1. Contiguous to the zigzag wheel, a vertical lever *f,* is mounted upon a fulcrum pivot *g,* which enables it to vibrate. In the side of this lever, a pin is fixed, which carries a friction roller *h,* that

works in the excentric or zigzag groove of the wheel *e*, and consequently as the wheel goes round, the lever *f*, vibrates to and fro. At the upper extremity of the lever *f*, a short rod *i*, connects the said lever to the crank arm *j*, fixed on the end of a horizontal shaft *k*, which extends nearly half way along the back part of the machine. At the reverse end of this shaft *k*, another crank arm *l*, is fixed, seen in the section, fig. 2.; which, by means of a rod *m*, is connected to the back landing bar *n*, (that and the front landing bar being connected together by the ordinary goose-necked tackle.) Hence it will be perceived, that the vibrations of the lever *f*, actuated by the zigzag grooved wheel *e*, give those successive movements to the landing bars, which in ordinary Lever's machine are effected by the workman raising the handles affixed to the front landing bars; the object and effect of which is so well understood, that no further explanation is deemed necessary.

Upon the main shaft *d*, near the centre of the machine, the cam or excentric roller *o*, is fixed; see the section fig. 2. On the periphery of which a tooth *x*, extending from the under part of a lever *p*, is intended to work as the cam goes round; this is for the purpose of moving the pusher bars, which divide the bobbin carriages, after every fourth stroke of the landing bars; an operation which, in ordinary Lever's machine is performed by the foot of the workman pressed upon a treadle below. From the acting extremity of the lever *p*, two rods or arms *q*, *q*, extend, and at their upper ends are jointed to bent levers *r*, *r*, *r*, *r*, which have their fulcrums *s*, *s*, on the same axles as the pusher bars *t*, *t*. The pusher bars necessarily rise and fall with the landing bars, as in ordinary Lever's machines, but it is only after every fourth stroke of the landing bars, that the pushers are to be brought into operation. This is effected when the elevated part of the cam *o*, comes round as shewn in fig. 2, at which time the lever *p*, is raised, and with it the rods *q*, *q*, which expand the joints at the tails of the bent levers *r*, *r*, and cause their upper ends at *u*, *u*, to press against

the backs of the pusher bars, and force the pushers in: by which means the carriages are divided. This takes place at the time that the landing bars are finishing their fourth stroke.

The particular form in which we recommend the cam *o*, to be made, is shown in fig. 3. When the tooth *x*, of the lever *p*, has risen to the highest point of the cam *o*, it passes down the first short inclined plane, for the purpose of bringing the ends *u*, *u*, of the levers *s*, *s*, gently into contact with the pusher bars, in order to avoid concussion; and when the ends of the levers have been thus brought into contact with the pusher bars, as the tooth *x*, travels upon the small concentric segment of the cam, the joints of the levers *q*, *r*, remain nearly stationary, and the pushers are pressed in to divide the carriages by the closing of the landing bars.

At this time the two catch bars *v*, *v*, falling into the ears of the bobbin carriage, for the purpose of locking them, as it is commonly called, it is necessary to ease its descent, in order to prevent concussion, which we do by the employment of a small apparatus, acting under each of the catch bars, as shewn at *w*, *w*, fig. 2, which resembles a pair of pliers or the bills of a duck. The lower chap is fixed to its standard, the upper one opens upon a joint, having a lever tail with a helical spring, acting to keep the chaps open; one of each of these apparatus are mounted upon each of the pusher bars, and when the pushers are pressed in to divide the carriages, the nose of each of these pliers are carried under the catch bars, and when the catch bars fall as above said, the upper chaps of the open bills receive them, and allow of their descending gently by the resistance of the springs; and then, by resting upon the closed bills, are prevented from falling upon the pushers, which lie under them. When the bills *w*, *w*, have by these means become closed, the time has arrived for the tooth *x*, to pass down the second inclined plane of the cam *o*, which causes the joints of the levers *q*, *r*, to descend, and allow of the pusher bars

drawing out from under the catch bars, which is effected by helical springs adapted to each of the pusher bars, in the same way as the back pusher bar is drawn back in the ordinary Lever's machine. It is necessary that the landing bars should be stationary at the time that the pushers are drawn from under the catch bars; and in order to effect this, a portion of the cam or zigzag groove of the wheel *e*, is removed or cut away, as shewn at *x*, in fig. 1, which allows the wheel to turn through a small part of its rotation without moving the lever *f*. This point of the cam or zigzag wheel *e*, is made shorter than the other three, in order that the landing bars at this time may only go in as far as the locking place in the ordinary Lever's machine.

The working of the point bars is effected by the rotation of the small toothed wheel at the left hand end of the main shaft *z*, which drives a large wheel on the back horizontal shaft *y*. This shaft has two wipers acting against the ends of the pusher levers, which lift the tail poles of the point bars, as shewn in the section fig. 2.; but this part of the machine is not claimed, as the invention is stated to consist in the new method or mechanism for working the landing bars and the pusher bars, as above described.—[*Inrolled in the Rolls Chapel Office, July* 1831.]

Specification drawn by Messrs. Newton and Berry.

To George Johnson Young, *of the town and county of Newcastle-upon-Tyne, iron founder, for his invention of a machine, whereby an additional and improved purchase or power will be given in working ships' windlasses and capstans.*—[Sealed 21st June, 1828.]

The proposed improvement consists in connecting to the barrel of the windlass or capstan a pair of wheels of dissimilar diameters, and applying the actuating power

to the axle of the lesser wheel, by which an increase of power is communicated to the barrel that the cable is to be wound upon, though of course at the expense of time. This does not appear in itself to possess any novelty, but we presume that the Patentee considers his invention to consist principally in the mode of gearing the two wheels together, which is by an endless chain passed over the periphery of two star wheels, the links of the chain taking hold of the points and indentations of the star wheels instead of teeth taking into each other as in ordinary tooth and pinion gear.

In Plate XI. fig. 5, is an end view of a windlass turning upon its axle *q*, mounted in wooden standards. Upon the end of the axle of the windlass, the large star wheel *b*, is affixed. A smaller star wheel *c*, is mounted upon an axle above, and over the periphery of both wheels the endless chain *d*, *d*, *d*, passes. The chain is formed by circular rings, connected together by flat links, and the rings are made to fit into the cavities of both the star wheels, the points of the stars of course falling into the links between the rings.

On applying the power of the men, either by handspikes or winch, to the axle of the lesser wheel *c*, that wheel will be forced round, and the chain with it, and consequently cause the chain to draw the larger wheel *b*, which gives rotary motion to the windlass.

To every alternate link a pall *e*, *e*, *e*, is attached, which, passing round with the chain, come into operation in the segment rack *f*, *f*, below, and prevent the windlass from recoiling as it draws up the cable and anchor.

A similar contrivance to that above described is also proposed to be adapted to a capstan, but of course the wheels must, in that case, be placed in horizontal positions. Two horizontal wheels of equal diameter, turning

on stationary axles, are made to carry an endless chain, constructed of circular rings and flat links as above described; these rings and links, as they go round the wheels, are made to take hold of the points and recesses formed in the interior of an escolloped ring attached to the lower part of the capstan barrel. By applying the power of the men to one of the wheels described, the chain will be made to drag round the barrel of the capstan with an increased power to that applied, but of course with a slower motion than that of the actuating wheel.

It is scarcely necessary to add, that when a capstan or windlass is required to exert only an ordinary power, the handspikes of the seamen are to be applied immediately to the capstan-head or barrel of the windlass, and the effect will be the same as if the improved machinery were not connected to it.—[*Inrolled in the Inrolment Office, December*, 1828.]

To John Burgis, *of Maiden Lane, in the parish of St. Paul, Covent Garden, and county of Middlesex, ornamental paper manufacturer, for his new invented method or methods of gilding or silvering certain woven fabrics in burnished, or burnished and dead or metted gold or silver, and which said fabrics may be used as gold or silver and lace borderings, and for other purposes.*—[Sealed 5th February, 1829.]

The very great expense of gold and silver lace, has induced the Patentee to invent a simple and cheap mode of manufacturing an imitation of that costly material, which he proposes to employ in decorating curtains, chairs, and other articles of household furniture. The material to be employed is fine cotton or other cloth, upon which a coating of gold or silver leaf is to be laid, by the ordi-

nary process of gilding and silvering. The cloth is then to be cut into narrow strips, and wound round cords to resemble cords of gold, which cords may then be plaited or otherwise woven into lace of various kinds.

The cloth about to be operated upon is first dried (if for gold of an orange or yellow colour). It is then to be stretched out upon a flat surface, and covered with a coating of size made of parchment shavings, in the same way that gilder's size is commonly made. When dry, the reverse side of the cloth is to be sized in the same way.

After this preparation, two or three coatings of the material called gold size, is to be laid upon that surface of the cloth which is intended to be gilt; this size being made of glutin, with pipe clay and ochre, or other yellow colour. When the materials have become perfectly dry and hard, the surface is to be polished smooth, and all hairs or small pieces of grit removed.

The cloth being tightly distended upon a flat surface, is now to be sponged over with water, and then the leaf gold laid on smoothly with a gilder's camel hair brush, taking care that all the fractured parts of the gold leaf are afterwards carefully covered with fresh pieces of gold leaf, so as to leave no parts of the surface ungilt.

When the gilding has become perfectly dry and hard, the cloth may be passed over a roller, and brushed, for the purpose of burnishing its surface; and if it has been gilt on both sides, that part of the cloth which is undermost should be carefully covered with paper to protect it from injury while under the operation of the burnishing brush. But when dead gold is required, then the burnishing brushes may be dispensed with.

The cloth having been thus gilt, is then to be cut into strips of any required width, in a machine, with knives or shears placed at suitable distances, in order that the strips

may be perfectly parallel. These strips are then to be wound or bound round cords of suitable thicknesses, the cords having been previously dyed of an orange or yellow colour; and the cords, after having been so covered with the gilt cloth, may be twisted together to represent bullion, or in any other way plaited or woven in the manner that gold lace is commonly made. Precisely the same operations are to be performed in the preparation of silver lace.

This artificial gold or silver lace may be applied as cording or bindings for the edges of chairs, sofas, &c. or for the fringe of curtains and other drapery.—[*Inrolled in the Inrolment Office, April,* 1829.]

To Thomas Revis, *of Kennington-street, Walworth, in the county of Surrey, watchmaker, for his invention of an improved method of lifting weights.*—[Sealed 10th July, 1828.]

The object of the Patentee appears to be that of converting a reciprocating lever action into a rotary motion; but as to the advantages anticipated by this particular arrangement of machinery the Specification is silent, and we are at a loss to discover either novelty or utility in the plan proposed.

Plate VIII. fig. 11, represents an end elevation of the machine intended to be employed as a crane for lifting heavy weights; *a, a, a,* is one of the forked standards or end framework of wood or iron, upon which the axles and wheels are mounted; *b,* is the barrel that receives the draft rope; *c,* a lever to actuate the machinery, having a counter poise or balance weight at the end of its shorter arm.

The lever *c*, is affixed to the axle *d*, and when raised and depressed gives reciprocating rotary action to the axle *d*. The toothed wheel *e*, slides loosely round upon the axle *d*, and a similar toothed wheel *f*, slides also loosely round upon the axle *g*, the teeth of these two wheels *e*, and *f*, taking into each other, and also into the teeth of the upper wheel *h*, fixed on the end of the barrel *b*. At the reverse end of the machine there is affixed to each of the axles *d*, and *g*, a toothed wheel, exactly corresponding with *e*, and *f*, and the teeth of which likewise take into each other. It will hence be perceived, that on depressing or raising the lever *c*, the axle *d*, will be made to turn with a reciprocating action, and through the intervention of the toothed wheels last described, fixed at the further ends of the axles *d*, and *g*, both those axles will be made to turn simultaneously.

Upon each of the axles *d*, and *g*, there is also affixed a ratchet wheel *i*, and *k*, and palls or clicks *l*, *l*, *l*, *l*, which hang upon pivots set in the rims of the loose wheels *e*, and *f*, take into the teeth of these ratchet wheels. Now, on the lever *c*, being depressed, the axle *g*, and with it the ratchet wheel *i*, will be made to turn part of a rotation, as shewn by the arrow, and the teeth of this ratchet wheel taking hold of the clicks or palls *l*, attached to the loose wheel *f*, drag that loose wheel round with it, and cause the upper wheel *h*, on the end of the barrel *b*, to turn also, and hence to wind upon the barrel the rope *m*, to which the weight intended to be raised is supposed to be appended. On raising the lever *c*, the wheels will of course turn in reverse directions, the ratchet wheel *k*, the teeth of which before slipped over the ends of the palls *l*, affixed to the rims of the loose wheel *e*, will now take hold of the palls, and drag the wheel *e*, round with it, and cause the wheel *h*, again to turn, and thus to con-

tinue winding up the rope *m,* by which the weight is raised.

Hence, by the continued reciprocating action of the lever *c,* the barrel winds up the rope and raises the heavy body.—[*Inrolled in the Inrolment Office, January,* 1829.]

To THOMAS SPINNEY, *of Cheltenham, in the county of Gloucester, gas engineer, for his invention of cercertain improvements in apparatus for manufacturing gas for illumination.*—[Sealed 2d June, 1831.]

THESE improvements in manufacturing gas for illumination, consist in the adaptation of a valve to the ascension pipe leading from the retort or brick oven in which the gas is generated. The object of this valve is to supersede the employment of an hydraulic main, and thereby to take off the pressure to which the gas has hitherto been subject in passing through the hydraulic main. The advantages attendant upon thus removing the pressure are two-fold; firstly, a considerable increased durability of the retort or oven; and secondly, a much larger quantity of gas obtained from whatever material may be used for the production of gas for illumination.

In order to render these improvements in the manufacture of gas evident, drawings exhibiting the construction and mode of adapting the valve to the ascension pipe, employed for the above purpose, are appended to the Specification.

Plate XI. fig. 1, is a front view of a brick oven to be used as a retort for generating gas; *a,* is the mouth of the oven; *b,* the fire door; *c,* the ascension pipe; *d, d, d,* sight holes for examining and cleaning the flues; *e,* is the valve-box, placed upon the ascension pipe; fig. 2, is a

side view of the valve detached from the ascension pipe, and upon a larger scale; figs. 3 and 4, are vertical sections of the same; *f*, is the lower pipe through which the gas passes from the ascension pipe into the valve or box; *g*, is the lateral pipe by which the gas proceeds to the purifiers; *h*, is the cylindrical cap or cover, which is made to move up and down by means of its rod passing through a stuffing box; *i, i, i*, is a reservoir of water, tar, or any other liquid, in the lower part of the valve-box, into which the cylindrical cap or cover *h*, descends for the purpose of shutting off the passage of the gas. In fig. 3, the cap or cover *h*, is raised, which allows the gas to pass freely from the generator to the purifying vessels and gas-holder; fig. 4, shews the cap or cover dropped down into the reservoir *i, i*, which effectually shuts off all communication between the gas-holder and the retort or oven.

The Specification concludes by saying, I have exhibited in the drawing accompanying this Specification, such a form and construction of valve as fully answers the above purpose; but I do not intend to confine myself to that particular form or construction, as my invention consists in the adaption of a valve, of any suitable construction, to the ascension pipe of a gas retort, oven, or generator, for the purposes of superseding the necessity of the hydraulic main hitherto used.—[*Inrolled in the Rolls Chapel Office, August*, 1831.]

Specification drawn by Messrs. Newton and Berry.

To JOHN JOHNSON ISAAC, *of Star-street, Edgware Road, in the county of Middlesex, engineer, for his invention of improvements in propelling vessels, boats, and other floating bodies.*—[Sealed 5th July, 1828.]

THE Patentee proposes by this invention, to propel vessels without subjecting the water on which they float to

any considerable degree of agitation, to render such vessels much more buoyant than those of the ordinary construction—to prevent their rolling or heeling when in a rough sea, and so to inclose the propelling machinery, that it shall be less liable to accident than in the usually exposed situations of the paddle wheels at the sides of ships.

In order to effect those objects, the stern part of the vessel is to be elongated; that is, the sides are to be continued for some distance beyond the ordinary stern, for the purpose of constructing a compartment capable of containing the propelling wheel; which compartment is to have an open channel at the fore end, for the admission of the water, and also an opening at the hinder part, for its discharge.

Plate VIII. fig. 12, is a longitudinal section of a vessel, *a*, *a*, being the elongation at its stern; *b*, is a false bottom or partition forming the under part of the compartment; *c*, is the channel through which the water passes into the compartment, and *d*, is the opening at which it is to escape; *e*, is the paddle wheel, formed by an air-tight drum, with float boards or radial paddles fixed round it. The ends or pivots of the axle of this propelling wheel turn in long grooves or slots in the sides of the compartment, in order that the wheel may be raised or lowered according to the draft of the vessel, so as to dip a certain depth only into the water, however little or much water the vessel may draw; and this contrivance will allow of the wheel being drawn up altogether out of the water, in the event of the vessel being propelled by sails alone.

In order that this wheel may be uniformly turned by the impelling power of the engine within, it is proposed to drive it by chains passed over spur wheels upon its axle, instead of toothed gear, as in ordinary steam vessels.

The compartment, *a, a,* being closed on the sides, it is considered, that the agitation of the water caused by the rotary action of the paddles will be restrained, and that it will flow out behind in a smooth current; to assist which, a wheel *f,* with many arms, is placed within the compartment near to the paddle, for the purpose of breaking the surf of the tail water, thereby enable the propelling wheel to be employed on canals.

It is also considered, that when steam vessels are exposed to very rough sea, the elongation at the stern and the enclosure of the paddle wheel within the compartment will prevent the vessel from heeling or laying to, and cause it to pass through comparatively still water; and the contrivance for raising the wheel will allow of its axle being raised or depressed on one side if necessary, so as to revolve parallel to the surface of the water, however much the vessel may incline from an erect position.

It is further stated, that the propelling wheel being formed of a hollow drum, which is made perfectly water-tight, that drum will constitute an air vessel, to assist in case of need in rendering the vessel buoyant; and that buoyancy may be aided by filling all the vacant parts of the vessel, such as the recesses between the timbers and under the gunwales with small air vessels, cork or any other light or floating material; and the sides of the compartment *a,* may be packed with such soft or flexible materials as shall resist external force, in order to protect the propelling machinery from gun-shots or other destructive weapons.

The Patentee acknowledges that the separate parts above described are not new, but he states that his claim of combination and arrangement, and consequently of beneficial effect resulting from their exclusive appropriation to which this patent entitles him, consists in the follow-

ing particulars. First, the peculiar construction of a buoyant vessel, which in being propelled by means of a paddle wheel shall so little disturb the water as to render it capable of being employed upon canals. Second, that a vessel so fitted up will be less effected by heeling or laying to, and will therefore be in comparatively still water, although the sea may be rough. Third, the machinery being enclosed and guarded by the elongated sides of the vessel, and which may be made shot and bomb proof, is less liable to accident in action.—[*Inrolled in the Inrolment Office, January,* 1829.]

To THOMAS, WILLIAM, and JOHN POWELL, *of the city of Bristol, glass merchants and stone ware manufacturers, for their invention of certain improvements in the process and machinery, or apparatus for forming, making, or producing moulds or vessels for refining sugar; and, in the application of materials hitherto unused in making the said moulds.*—[Sealed 17th May, 1828.]

THE Patentees propose to make the conical moulds or vessels in which refined or loaf sugar is moulded from stone ware clay, and to glaze them both within and without.

In the first instance, the stone ware clay is to be prepared in the usual manner, and is then to be put under a press, for the purpose of bringing it into a sufficiently stiff and compact consistency. In the bottom of the vessel in which the clay is pressed, a mould is placed, consisting of a flat board, with a broad conical aperture cut out of its centre. In this aperture of the board the clay is to be shaped, which is to form the vessel.

As the board lays flat under the press, the clay will necessarily be forced into the recess or aperture, which being done, it is then cut off level from the clay which is above it, by passing a wire or string, or thin cutting blade over the surface of the board, which leaves the portion of clay thus moulded in a thin slab of a broad conical form.

This slab of clay, while in its plastic state, is then placed round a conical block, so as to cover the block perfectly, and any small defects which may be left at the junctions of the edges of the slab are to be made up with small portions of clay laid on with a spatula or pallet knife.

The block is now set in a convenient situation, where the coating of clay may be dried by the air; and when it has become completely dry, the block is fixed upon a rotary spindle passed through its axis, and the outside of the clay vessel is turned perfectly smooth in the same way as stone ware articles are usually made.

The shell of clay being then slipped off its block, will be found to be an accurately formed conical vessel, having a small hole in its apex, and suited for the purpose of a sugar mould, perfectly smooth both within and without.

Any number of these conical vessels may then be placed upon their bases side by side, in an oven, for the purpose of being baked, and they are to be glazed within and without by salt, as clay stone ware is usually glazed. —[*Inrolled in the Inrolment Office, July,* 1828.]

To THOMAS BAILEY, *of Leicester, in the county of Leicester, frame-smith, and* CHARLES BAILEY, *of the same place, frame-smith, for their having invented or found out certain improvements in machinery for making lace, commonly called bobbin-net.*—[Sealed 15th February, 1831.]

THESE improvements in machinery for making bobbin-net lace, apply to that particular construction of machinery known by the name of the *Lever's principle,* and consist in certain variations from the original mechanism of the Lever's machine, by means of which those parts of the mechanism called the pushers, the pusher-bars, and all the appendages heretofore employed in connection with those working parts which are called the dividing tackle, are altogether dispensed with: and the dividing of the bobbin carriages is effected by means of a peculiar construction of catch-bar about to be described, and the mode of working them. And in order to afford additional safety in working the Lever's machinery, and prevent any derangement of the bobbins and carriages by the vibrations of the machinery, when in rapid action, a simple contrivance is adopted, consisting of a series of small thin pieces of metal, resembling the elongated extremeties of the ordinary combs, which pieces are mounted in leads as combs are usually mounted, and denominated conducters, as they are for the purpose of conducting and keeping the bobbin carriages apart, and preventing their shifting from their proper situations when at work.

As the construction of the ordinary Lever's machine is well known to lace-makers, and has been often explained in the pages of our Journal, it will be unnecessary to describe its operative parts; we shall therefore merely mention the several parts as they occur, by name, and

refer only to their uses, conceiving, that in so doing, the invention will be perfectly understood by all who are acquainted with the Lever's machine.

In the Lever's machines heretofore used, it was necessary, in dividing the bobbin carriages, to employ a series of fingers, called pushers, which, acting against every alternate carriage, forced those carriages out of the uniform range, in order that one-half of the carriages might be taken hold of and drawn out by the back catch-bar, and the other half by the front catch-bar, when the machine next opened. Instead of this contrivance, a compound catch-bar is constructed, consisting of a series of pieces of metal, which fit closely into the spaces between each other, and when combined, form a solid blade or bar, resembling in shape and appearance the blade of the ordinary catch-bar. Plate VII. fig. 3, is a front view of a pair of leads, with the pieces cast in them in the same way as ordinary pushers, or comb leads, forming when combined, a portion of the blade of a catch-bar; fig. 4, is a side or edge view of the same; fig. 5, represents front views of the two parts of the catch-bar blade detached; and fig. 6, edge views of the same; A, is that part of the compound lead which is to be fixed on to the ordinary catch-bar; B, is that part of the compound lead which is to be fixed on to another flat bar placed above the catch-bar. When these two parts are united, as shewn in figs. 3 and 4, they form the solid blade of the catch-bar, and then take hold of all the carriages, as shewn by the back catch-bar *c*, in fig. 7. This figure is a transverse section taken through the machine at the time when the bobbin carriages are all in one uniform range, and the machine is closed; fig. 8, is a similar section taken through the machine when the bobbin carriages are about to be divided.

In effecting the dividing of the carriage in the ordinary Lever's machine, it is first necessary to raise the catch bars out of the ears of the carriages, in order to allow the pushers to project every alternate carriage forward; but in the improved plan, the pieces *c*, are only raised, which constitute one half of each compound catch bar, while the pieces *d*, which constitute the other half of the compound catch bars, remain in the ears of the carriages, as shewn in fig. 8, observing that the pieces *d*, of the back catch bar, take hold of the ears of one half of the carriages, and the piece *d*, of the front catch bar, take hold of the ears of the other half of the carriages.

It will hence be seen that on the machine opening, the pieces or fingers *d*, *d*, both of the back and front catch bars, draw out those carriages on which they are respectively intended to act, and as soon as the ears of the carriages of one range have cleared those of the other range, the piece *c*, *c*, with the bars *b*, *b*, immediately fall down, and form solid catch bars, as figs. 3, and 4, and consequently take the respective ranges of carriages to their destination, ready to be shogged, as in the ordinary operations of Lever's machines.

The construction and effect of these compound catch bars having been explained, the Specification proceeds to point out the means by which they are worked, to produce the rising and falling of the separate parts of the compound catch bars above described.

The vibratory actions of opening and closing the machine being effected, either by the ordinary handle in front, or by the rotatory apparatus through the agency of cranks and rods, the catch bar-wheels or tappets (which are placed in the middle of the machine) raise the catch bars as usual, except at the times of dividing the carriage, when a small piece *h*, figs. 7, and 8, called a stop,

slides behind the small lever *i*, affixed to the longitudinal rod *k*, *k*, *k*, one of which hangs in front of each landing bar, and as the machine closes, this stop *h*, pushes the lever *i*, outwards, causing the rod *k*, to be turned round a little distance upon its axis, as will be seen by reference to the dotted lines in the last-mentioned figures.

In order to slide the stop *h*, in a lateral direction, for the purpose of bringing it immediately behind the lever *i*, as above mentioned, a cam wheel is affixed upon the main shaft of the machine, which, as it revolves, causes a lever to be raised once at every fourth vibration of the machine, and to lift a rod which projects the slider that carries the stop *h*, into the required situation, behind the lever *i*, while the machine is open.

It will now be seen, by reference to fig. 8, that on the closing of the machine the levers *i*, *i*, strike against the stops *h*, *h*, and are consequently forced outwards, and that the rods *k*, *k*, to which the levers are affixed, turn round a short distance upon their axes, and thereby cause the small erect levers *q*, *q*, also fixed to the rods *k*, *k*, to strike against the lower arms of the elbow lever *r*, *r*. These elbow levers have their fulcrums or pivots in the small studs or standards *s*, *s*, affixed to the lower catch bars *a*, *a*, and when the lower arms of the levers *r*, *r*, are pressed inwards by the means described, the upper arms of the said levers passing into staples on the top of the upper end of the catch bars *b*, *b*, raise the bars, lifting up the parts *c*, *c*, of the compound catch bar blade, as shew[illegible] in fig. 8.

By these means every alternate bobbin car[illegible] leased from one of the catch bars, one [illegible] riages being held by the parts *d*, of [illegible] of the machine, and the other [illegible] the parts *d*, of the catch [illegible]

The opening of the machin[illegible] to divide, and by the time [illegible] have passed the ears of [illegible] levers *i, i*, having receded [illegible] catch bars *b, b*, are allowed [illegible] pound bars *c, d, c, d*, [illegible] bars then perform the [illegible] as in the usual construction [illegible]

On the three next open[illegible] chine, the stops *h, h*, will [illegible] the compound catch bars [illegible] with solid levers, as in ordinary machines: [illegible] fourth opening and closing of the machine, [illegible] will come into operation, and produce the effect [illegible] parts *c*, of the compound catch bars in [illegible]

We now proceed to [illegible] conductors, which are employed for [illegible] of keeping the [illegible] riages steady, and [illegible] from being [illegible] into wrong gates or [illegible] the [illegible] shaking or extraor[illegible] in rapid motion. [illegible] leads *t*, holding a [illegible] is a top view of the [illegible] condu[illegible] in th[illegible]

[illegible] *ent* [illegible] *am*, [illegible] *ereof* *board* [illegible] th Janu-

[illegible] ion of a box is either to be surplus steam boiler, when

or known by the name of Lever's principle."—[*Inrolled in the Rolls Chapel Office, August,* 1831.]

Specification drawn by Messrs. Newton and Berry.

To Joseph Clisild Daniell, *of Stoke, in the parish of Bradford and county of Wilts, clothier, for certain improvements applicable to the manufacturing and preparing of woollen cloths.*—[Sealed 5th August, 1828.]

There are two objects proposed under this patent; the first is designed to preserve a uniform tension in the warp threads of a cloth loom, the second, to give additional force to the beaters of a stock for fulling cloth.

In the first instance, the loom is not intended to be altered in its general construction from ordinary looms for weaving cloth, but there is affixed to the end of the warp roller a pulley, over which a weighted cord is passed for the purpose of drawing the warp tight, and at the same time allowing it to be given out as the batten beats up the work. A similar pulley is also attached to the end of the work roller, with a weighted cord passed over it in the opposite direction to the former, in order to draw up the work. Hence, the warp threads are always kept at a uniform tension, and when any additional force is exerted as in beating up, a small portion of the warp only is given out, by the roller slipping round under the weighted cord.

The second feature of the invention applicable to fulling stocks, is designed to supersede the present mode of allowing the beaters to fall from a height by their own gravity, and to effect the beating and milling,

of the cloth by their descent. Instead of this, it is proposed to raise the beaters but a short distance up from the cloth in the cell of the stock, and to give forcible effect to their descent by means of powerful springs acting at the back of the arms of the beaters.

The adaptation of springs to the backs of the beaters, for the purpose above stated, may be effected in various ways, and by several kinds of springs, all of which the patentee claims as coming under his invention, and the advantages anticipated are that considerable time may be saved in the performance of the fulling or milling process, by shortening the stroke of the beaters which will allow of a much more frequent repetition of the blows than when the beaters are allowed to fall from a height, and the power of the spring upon the improved plan may be made to give an equally effective blow to that produced in the ordinary stock by the descent of the beaters from gravitation.—[*Inrolled in the Inrolment Office, February* 1829.]

To Samuel Seaward, *of the canal iron works, in the parish of All Saints, Poplar, and county of Middlesex engineer, for his having invented an improvement or improvements in apparatus for economizing steam, and for other purposes; and the application thereof to the boilers of steam engines employed on board packet boats and other vessels.*—[Sealed 15th January, 1831.]

The subject of this patent is the adaptation of a box or vessel contiguous to the boiler, which is either to be employed to receive and condense the surplus steam usually blown away at the safety valve of the boiler, when

the pressure of the steam has arisen to an extraordinary height, or by producing a vacuum in this box to draw or pump water from the hold of the ship, or from the sea, for the supply of the boiler; in both of which cases a saving of fuel is effected.

Plate XI. fig. 6, *a a a*, represents the front elevation of a boiler for a steam vessel; *b b*, is the box or vessel above mentioned, placed upon it, called a receiver, which should be made equally as strong as the boiler, in order to resist the pressure of the steam, and of about one twentieth of the capacity of the water chamber within the boiler. This receiver is most conveniently situated when placed upon the top of the boiler, as in that situation the water contained in it will more readily descend into the boiler by its own gravity.

To this receiving vessel *b*, there is attached four pipes with stop cocks. The pipe *c*, proceeds from the upper part of the receiver to the steam chamber of the boiler; the pipe *d*, from the lower part of the receiver to the water on the outside in which the ship floats; the pipe *e*, from the top of the receiver down to the bottom of the hold of the ship; and the pipe *f*, from the bottom of the receiver to the water chamber of the boiler.

When the steam has acquired so much pressure as to raise the safety valve and escape, either in consequence of the engine standing still, or by an extraordinary quantity of heat emitted from the furnace; the stop cock of the pipe *c*, is to be opened, when the receiver will be filled with steam; the air escaping by a discharge cock at *g*. On the receiver having become filled with steam, the stop cock of *c*, is to be closed, and also the discharge cock *g*, and the cock of the pipe *d*, opened when the steam will immediately become condensed within the receiver, and a partial vaccuum being thereby formed,

the water will then rush from the outside of the ship, and fill the receiver. The cock of the pipe *d*, is then to be closed, and that of the pipe *f*, opened, when the water will descend slowly into the boiler by its own gravity, and at a temperature very little below the boiling point.

By this operation it is considered a saving of fuel will be effected, because at all times the boiler may be completely filled with water which has been heated by the steam that would in the ordinary way have escaped to waste, and even to the annoyance of the passengers on board.

The operation of drawing water from the hole of the ship by means of this improved apparatus is equally simple; let the stop cock of the pipe *c*, be opened and the receiver *b*, by that means be filled with steam as before, then on closing the cock *c*, and opening that of *e*, the steam will become condensed, and the water from the hold rush up the pipe, into the receiver, from thence it may be discharged over board, by opening the cock of the pipe *d*; this operation may be repeated until the ship's hold is perfectly dry. Fifty or sixty tons of water every hour may be by these means discharged with ease from a ship carrying an engine of about one hundred horse power, by simply employing the spare steam when the engine is at rest.

The Patentee concludes his Specification by saying, that he claims the above contrivance when applied to the boilers of steam engines employed on board packet boats, and other vessels, for the purpose of economising steam, but not when employed for other purposes.—[*Inrolled in the Petty Bag Office, July,* 1831.]

To PEREGRINE PHILLIPS, *Jun. of Bristol, vinegar maker, for his invention of certain improvements in manufacturing sulphuric acid, commonly called oil of vitriol.* [Sealed 21st March, 1831.]

THE Patentee commences his Specification by describing the old mode of making sulphuric acid, by way of introduction to the explanation of his new process.

Sulphuric acid, or oil of vitriol, is generally made by the combustion of sulphur and saltpetre, either mixed together in large chambers or leaden vessels, or separately in ovens connected with leaden vessels, into which a greater or less portion of atmospheric air is admitted. The sulphur at first is converted into sulphureous acid gas, and then by the agency of nitrous gas united with oxygen from the atmosphere, or from that liberated from the saltpetre, is gradually converted into sulphuric acid; which is afterwards absorbed by the water that covers the bottom of the leaden vessel. Such is the ordinary mode of producing that article.

The first improvement proposed to be effected by the Patentee, is an instantaneous union of the sulphureous acid gas with the oxygen of the atmosphere, for the purpose of saving the expense of saltpetre, and also the great outlay in providing leaden vessels or chambers, which are requisite in manufacturing sulphuric acid upon a large scale, when the sulphureous acid gas is to be gradually converted into sulphuric acid.

The second improvement proposed is the more perfect condensation of the sulphuric acid by a superior method of absorbing it than that heretofore practised.

The first feature of the improvement, (viz.) that of instantly uniting the sulphureous acid gas with the atmosphere, is effected by drawing them in proper proportions,

by the aid of an air pump, through a heated tube of platina, porcelain, or other material, which is not acted upon chemically, when in a heated state, by the sulphureous acid gas. In this tube or tubes, fine platina wire is to be placed, or platina in a very finely divided state, and to be then heated until raised to a strong yellow heat, and this is best done in a reverberatory furnace.

Sulphureous acid gas being made to pass in this way with a sufficient supply of atmospheric air through such tubes when properly heated, will be instantly converted into sulphuric acid gas, which will be rapidly absorbed as soon as it comes into contact with water.

The sulphureous acid gas is to be generated by the combustion of sulphur or pyrites, or any other metallic sulphuret, in a close oven, having one or more apertures for the admission of atmospheric air, and another aperture leading to or communicating with the tube.

The relative proportions of sulphureous gas and atmospheric air must be regulated by the size and working of the air pump, which must throw out at least eighty-five cubic feet of air for every pound avoirdupois of sulphur consumed.

The improved mode of condensing the sulphuric acid is, by employing a chamber of a circular form, about eight feet in diameter, and thirty feet high, which is proposed to be constructed of silicious stone; but these precise dimensions and materials are not indispensible. This chamber is to be lined throughout with lead, and to be filled nearly to the top with silicious pebbles or any other suitable materials which will present an extended surface, and cannot be acted upon chemically by the acid. Upon the top of the pebbles a sheet of lead is placed, which has been previously perforated with many small holes as a colander.

The top of the chamber is to be closed air tight by a dome, and through a small tube in the dome a quantity of water, or dilated acid is to be poured upon the pebbles. A leaden pump with leaden tubes is to be placed on the side of this chamber, for the purpose of drawing the liquor from the bottom of the chamber, and delivering it through a lead funnel at the aperture in the top of the dome.

This pump is to be kept constantly at work during the operation by means of a steam engine, and the funnel must be always partially filled with liquor, in order to prevent the admission of air into the chamber; the pump being of such dimensions as will continually raise a sufficient quantity of liquor to keep the pebbles always wet.

A pipe leading from the heated tube above described after passing through water for the purpose of cooling it, terminates in this chamber just above the top of the pebbles; and another pipe going off from the top of the chamber leads to the air pump. By this contrivance all the air which is passed from the heated tube and charged with sulphuric acid will be made to pass through the bed of pebbles, which having a supply of water or diluted acid continually running down between them, cause the acid to be condensed and absorbed by the water.

When the liquor is considered to have become sufficiently charged with acid, or when it will absorb no more sulphuric acid gas, which may be known by examining the air discharged from the air pump, it is to be drawn off by a pipe or cock in the bottom of the chamber, and treated in the usual way.

The Patentee has not thought it necessary to append drawings to his specification, as it is conceived that the

general construction of the apparatus, which is not confined to any particular form, will be perfectly understood without; but has concluded by saying:—I do not claim a right to any mode by which sulphur or sulphurets may be converted directly into sulphuric acid by the action of heat or otherwise, if such method even has been, or ever shall be discovered, but I claim an exclusive right to any plan by which sulphureous gas and atmospheric air either alone, or mixed with any other gas or gases, shall be either forced or drawn by an air pump, or by any other mechanical means, through an ignited (query heated?) tube or tubes.

I also claim the exclusive right to the use of platina in any finely divided state, for the purpose of assisting the action of heat, in combining sulphureous gas with oxygen in the manufacture of sulphuric acid. I likewise claim an exclusive right to every mode by which chambers used in the manufacture of sulphuric acid, can be charged with silicious pebbles or other substances for the purpose of exposing extensive surfaces, and which surfaces can be either constantly or occasionally moistened by the liquor pumped or drawn from below.—[*Inrolled in the Petty Bag Office, September,* 1831.]

To JOHN DIXON *of Wolverhampton, and* JAMES VARDY, *of the same place, for their having invented certain improvements in cocks for drawng off liquid.*—[Sealed 13th December, 1830.]

THIS invention is applicable to that description of cocks which contain a round plug or valve within the interior of the cock, the plug being conical, and fitted to fill up and

stop a corresponding aperture or seat formed in the passage through which the liquor is intended to flow when it is drawn off. The plug is to be pressed down into the aperture of its seat, by means of a screw formed on the upper part of the stem of its spindle, which works in a corresponding hollow screw formed in the head part of the cock.

When the plug is turned so as to screw it down to its seat, the passage of the liquor is stopped, but, on turning it back again, the screw raises the plug, and opens the passage for the flow of the liquor. This is a common construction, and it is upon this kind of cock that the present improvements are founded.

In the ordinary cocks of the description above mentioned, in order that the screw and internal plug or valve may be turned round by means of an external handle or key, the upper end of the spindle of the plug or valve (on the lower part of which the screw is formed) is made to pass through the top part of the cock, and a collar of leather or other flexible material is placed in the seat of the valve, to render the plug tight when shut down. But the liquor is very liable to leak between the stuffing and the seat of the plug, and also at the stem of the spindle, which the present invention is intended to prevent.

The Patentees say, "Our improvement consists in applying the action and force of the external turning handle, by means of which the internal plug or valve and its screw are to be turned round, in order to raise the plug or valve out of its seat, or else to press the same down into the seat, by means of a connection with the lower end of a small stem or spindle, which projects downwards from beneath the plug or valve, and passes through the centre of the aperture of the seat; the external turning handle and its connection with the lower stem of the

plug or valve, being constructed in the manner represented in the drawing. See Plate XI. figs. 7, 8, and 9.

"By virtue of our improvement, the communication of the necessary motion from the external turning handle to the internal plug or valve, and its screw, being made by means of a stem which descends from the lower side of the plug or valve, and beneath and beyond the seat into which the same is fitted, instead of making the said communication by means of a prolongation of that stem, which ascends from the upper side of the plug or valve, above the seat, no stuffing or collar of leather is required round the stem, whereby we communicate the turning motion to the plug or valve from the outside turning handle; and consequently if the plug or valve fits tightly into its seat, there is no junction of moveable and fixed parts at which the liquor can leak or escape from that part of the passage which is above the seat.

Fig. 7, is an external of the improved cock; fig. 8, is a section of the same, shewing its internal construction, the plug being screwed down, and the passage of the liquor closed. Fig. 9, is a similar section, the plug being raised, and consequently the passage open, as in drawing off the liquor; *a*, is the tube through which the liquor passes from the barrel, or other vessel in which the cock may be fixed, or from a pipe to which it may be attached; *b*, is the orifice or spout through which the liquor is discharged or drawn off; *c*, the conical plug or moveable valve; *d*, is the chamber of the cock, in which the plug acts; *e*, the seat for the conical plug to rest in; *f*, the stem, with the screw on its upper part, having sharp or oblique threads of seven or eight spirals; *g*, the hollow screw or recess into which the stem passes when the plug is raised.

The seat *e, e,* is formed of a distinct piece of metal from the body of the cock, and is attached thereto by a screw cut round it, having a collar of leather to keep it water-tight. The short central tube *h, h,* is formed with a cylindrical socket, and turns freely on the outside of the part *e, e,* by means of the handle *i.* Across the lower part of the stem *f,* there is a key piece, for the purpose of locking the stem to the tube *h,* into two perpendicular grooves, of which the key passes.

When the tube *h,* is turned round by means of the key *i,* the stem goes round with it, and by so doing causes the screw at the top of the stem to draw the plug up, and to open the passage. Turning the handle the reverse way, of course brings the plug down again, and stops the aperture. The rise or obliquity of the threads on the stem, must be such, that by turning the handle about one fourth, the valve will be completely raised, and the passage for the discharge of the liquor opened.

The socket *k,* which turns on the outside of *e,* is attached thereto by studs screwed from the outside, which pass into small grooves, and keep the tube from falling off.—[*Inrolled in the Petty Bag Office, February,* 1829.]

[In the first volume of our present series will be found the specification of Mr. Gossages patent for improvements in corks for drawing off liquors, on comparing which with the present specification, considerable similarity of construction will be perceived. It may therefore be needful to observe, that the former invention has, we understand, now become the property of the present Patentee, and of course any approximation to infringement is of no consequence. Ed.]

On the Friction and Resistance of Fluids. By George Rennie, Esq., V. P. R.S.

[Read before the Royal Society, June, 1831.]
(*continued from page* 158.)

In the consideration of this question, I propose to examine, first, the retardations of the surfaces of solids moving in fluids at rest; secondly, the retardations of fluids over solids; and, thirdly, the direct resistance of solids revolving in fluids at rest.

To illustrate the first case, I caused an apparatus to be constructed, of which fig. 10, Plate XI, is a representation; it consists of a cylinder of wood ten inches and three quarters in diameter, and twenty-four inches long, and divided into eight sections of three inches in each, and fixed upon a spindle of iron about four feet in length, and one inch and a quarter thick. The apparatus was accurately turned and polished. Upon the upper part of the spindle, a small cylinder or pulley, six inches in diameter was fixed, and a fine flexible silken cord, communicating with the weight, was wound; the apparatus was then fixed in an iron frame, and the frame let into a groove in two upright posts, driven into the bed of the river Thames.

The object of the frame was to allow the cylinder to slide up and down with the level of the tide, and immerse it more or less according to the experiment required to be tried. The friction of the apparatus, or the time that the weight took to descend in the atmosphere was first noticed; after which it was successively immersed in the water three, six, nine, twelve, fifteen, eighteen, twenty-one, and twenty-four inches, the difference of time showing the retardation according to the annexed Table.

Experiments on the Friction of the Surface of a Cylinder, twenty-four inches long and ten inches three quarters diameter, moving in air and in water.

TABLE I.

On Surfaces in Water.

Depth of immersion of cylinder.	Weight suspended.	Number of revolutions of cylinder falling the whole height of 26 feet.	Time in descending in water.	Velocity of periphery per second in water.	Time in descending in air.	Velocity of periphery per second in air.	Difference between air and water.	Remarks.
inches.	lbs.		seconds.	inches.	seconds.	inches.	seconds.	
3	1	Sixteen turns in descending. Periphery moves through 540.32 inches.	15.00	36.021	10	54.032	5.00	Resistance increased by surface with slow velocities, but not in the ratio of the surfaces.
6			18.00	30.017			8.00	
9			25.00	21.612			15.00	
12			28.00	19 267			18.00	
15			32.00	16.885			22.00	
18			37.00	14.603			27.00	
21			40.00	13 508			30.00	
24			55.00	9.824			45.00	
3	2	Ditto.	9.00	60.035	5	108.064	4.00	Resistance scarcely influenced by surface with increased velocities.
6			10.00	54.032			5.00	
9			10.50	51.459			5.50	
12			10.50	51.459			5.50	
15			10.50	51.459			5.50	
18			10.50	51.459			5.50	
21			11.00	49.120			6.00	
24			11.00	49.120			6.00	
On Velocities in Water.								
inches.	lbs.		seconds.	inches.	seconds.	inches.	seconds.	
24	4	Ditto	8.0	67.54	2 45	196.48	5.15	Could not be tried.
24	8		6.0	90.053	2 00	270.16	4.00	
24	16		4.0	135.08	1.50	360.21	2.50	
24	32		2.5	216.128				

Conclusions.

1. That the friction or adhesion of water against the surfaces of solids in motion, approximates the ratio of the surfaces with slow velocities; but that an increase of surface does not materially affect it with increased velocities.

2. That with equal surfaces the velocities do not seem to observe any fixed ratio, but approximate to the squares of the resistance.

With increased velocities the index of the power was found to be less than the duplicate ratio.

To exemplify the result of the foregoing conclusions in a different way,—the cylinder was removed, and circular discs of iron, ten inches and three quarters diameter and one-eighth of an inch thick, accurately adjusted to the spindle and polished, were substituted, as fig. 11. The friction of the apparatus was again tried, and immersed in the river Thames, as before.

TABLE II.

Experiments on the Friction in Water of Circular Discs ten inches and three quarters in diameter, and one-eighth of an inch thick, revolving with the planes parallel to the horizon, and six inches apart.

umber of discs.	Weight suspended.	Height fallen of weight.	Time of weight descending in water.	Velocity of periphery per second.	Time descending in air.	Velocity of periphery per second in air.	Difference.
lbs.	lbs.	Twenty-five	seconds.	inches.	seconds.	inches.	seconds.
	1	feet, mean	10.00	42.200			8.00
	2	circle 16.88	5.00	84.400			3.00
1	3	would move	3.00	140.660	2	211	1.00
	4	through 422	3.00	140.660			1.00
	6	inches.	3.00	140.660			1.00
	1		15 00	28.133			13.00
	2		6.50	64.923			4.50
2	3	Ditto.	4.50	93.770	2	211	2.50
	4		4.00	105.500			2.00
	6		4.00	105,500			2.00
	1		17.00	24.823			15.00
	2		7.00	60.285			5.00
3	3	Ditto.	5.50	76.727	2	211	3.50
	4		4.00	105.500			2.00
	6		3.00	140,660			1.00
	1		33.00	12.787			31.00
	2		17.00	24.823			15,00
4	3	Ditto.	8.00	52.750	2	211	6.00
	4		6.00	64.923			4.00
	6		4.00	105.500			2.00

Conclusions.

That the friction or adhesion of water is not quite as the surfaces with slow velocities, being in the ratio of one to three instead of one to four, but diminishes rapidly, without observing any ratio in increased velocities.* Hence the resistance of a ship or vessel moving through the water, with an average or higher rate of velocity, forms an inconsiderable portion of the resistance resulting from the displacement of the fluid, and that the brightness observed on the copper of ships after a voyage, may be owing to other causes than the friction of the water simply.

An experiment was made to ascertain the comparative resistance of a pipe revolving in water, and with water running through a pipe; when the resistance was found to be as the surfaces in slow velocities, but to diminish greatly, as before, in high velocities, without observing any fixed ratio.

The above conclusions are in contradiction of those of Coulomb, who did not find that pressure augmented the resistance, but states that the resistance is greater when the immersion is partial.

This apparatus being applicable to fluids generally, advantage was taken of it to ascertain the direct resistance of solids to fluids,† by causing plates and globes to revolve in them, with their planes perpendicular to the plane of the horizon (see fig. 12).

As the resistance of solids in fluids does not form the object of this paper, it will be necessary to introduce many detailed observations on the subject of these experiments at present, connected as they are with another branch of hydrodynamics. But as it is important to show the relation subsisting between the resistances of cohesion and impulse, I have ventured to detail rhe following experiments:—

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* The experiments of the Society for the Improvement of Naval Architecture show a decreased resistance with increased velocities.

† In this case, the number of particles struck will be diminished in the ratio of the radius to the sine of inclination; wherefore the resistance will be diminished in a duplicate ratio of the radius to the sine of inclination. But as the sines of inclination of the two plates are equal, the resistances will be equivalent to the area of one plate (moving perpendicularly to its planes) into the duplicate ratio of the velocity of its motion, and the density of the fluid.

Table III.

Experiments on the Rotations of Iron Discs and wooden Balls moving in Air, with their planes perpendicular to the plane of the horizon.

Weight suspended.	Height fallen.	Time in descending. Two circular discs 10⅛ inches diameter. Area 81 inches.	Velocity per second.	Time in descending. Two square fans. Area 81 inches.	Velocity per second.	Time in descending. Two wooden balls 10⅛ inches diameter.	Velocity per second.
lbs.	The spindle made 15.9 turns in falling 25 feet. Mean circle 51.83 would move through 68.67 feet.	seconds.	feet.	seconds.	feet.	seconds.	feet.
2		10.00	6.867	10.00	6.867	23	2.984
4		6.00	11.445	7.00	9.810	13	5.282
9		4.50	15.261	4.50	15.261	8	8.584
16		3.00	22.891	3.25	21.130	7	9.810
20		2.50	27.469	3.00	22.891	6	11.445

Conclusions.

1. That the resistances are as the squares of the velocity.
2. That the comparative resistances between discs and globes are as two to one nearly.

Table IV.

Experiments on the Resistance of Iron Discs and Wooden Globes revolving in Water.

Weight.	Height fallen.	Time in descending.					
		Two circular discs, 81 inches area.	Velocity per second.	Two square fans, 9 inches square, 81 inches area each.	Velocity per second.	Two wooden balls. Area 81 inches.	Velocity per second.
lbs.	The spindle made 15.9 turns in falling 25 feet. Mean circle 51.83 would move through 824.19 inches or 68.67 feet.	seconds.	feet.	seconds.	feet.	seconds.	feet.
16		63	1.09	53	1.29	15.00	4·57
20		54	1.27	48	1.43	14.00	4.90
32		43	1.59	40	1.71	10.50	6.59
40		40	1.71	35	1 96	9.50	7.22
64		30	2.28	28	2.45	8.00	8.58
256		14	4·90	15	4.57	5.00	13.73

Conclusions.

1. That the resistances are the square of the velocities.

2. That the mean resistances of circular discs square plates, and globes in air, are as the numbers 25.180, 22.010, 10.627;

and in water, 1.18, 1.36, 0.755; consequently the proportional resistances of air to water, with

Circular discs, is as	1 to	21.3
Plates and fans - -	1 to	16.2
Wooden balls - - -	1 to	2.2

Note.—A portion of the square fans, represented in fig. 12, and equal to one-fourth of the area of each fan, was cut off, when the resistance was found to be the same as with the square fans.

Experiments on the Quantities of Water discharged by Orifices and Tubes of different diameters and lengths, and at different altitudes.

The phenomena incident to spouting fluids are,

First, The inequality observed in the velocity of the particles comprised in every horizontal section parallel to the orifice.

Secondly, The contraction of the fluid vein beyond the orifice, and consequent diminution of discharge as compared with theory.

Thirdly, The inversion and changes in the sections of the fluid vein at different distances from the orifices.

All these phenomena have been noticed and recorded by various writers, and formulæ adapted to the different circumstances of the expendtiure have been given. But neither Bossut nor Du Buat (the most accurate of writers), have recorded a continuous and systematic series of experiments upon the comparative expenditure of orifices and tubes under the circumstances of area, altitude, and length.

The apparatus with which these experiments were performed, consisted of a wooden cistern very accurately made, two feet square inside, and four feet four inches in height. The water was kept at a constant altitude by a regulating cock; and a float having an index attached to it enabled the observer to ascertain the exact height at which the water stood in the cistern above the centre of the orifice.

The orifices were accurately made by Dollond in brass plates one sixtieth of an inch in thickness. The plates were accurately adjusted to a hole in the side of the cistern, and closed by a valve

of brass ground to each of the plates. The valve was opened by a lever, and the time noted by chronometers.

The diameters of the tubes, from having been drawn on mandrils, were as accurate as possible; their diameters at the extremities were carefully enlarged, to prevent any wire edges from diminishing their sections; and one extremity of the tube being inserted into a block of hard wood fastened to the cistern, and the other stopped by a valve, the experiments were recorded as before,

Constant height of the surface of the water above the centre of the orifice.	Real time in discharging one cubic foot.	Theoretical time in discharging one cubic foot. $t = \frac{Q}{2A\sqrt{gH}}$.	Ratio of the theoretical to the real discharges.	Vena contracta
Circular Orifice made in a brass plate 1 inch diameter, $\frac{1}{60}$ inch thick.				
feet.	seconds.	seconds.		
4	19.50	11.4	1 ; .584	Not accurately measured.
3	21	13.2]	1 ; .628	
2	26	16.1	1 ; .619	
1	36	22.8	1 ; 633	
Circular Orifice in a brass plate $\frac{3}{4}$ inch diameter, $\frac{1}{60}$th inch thick.				
4	33	20.3	1 ; .614	At six tenths of an inch from the orifice, the diameter had contracted to 0.685 of an inch.
3	37	234	1 ; .632	
2	44	28.7	1 ; .652	
1	63	40.6	1 ; .644	
Circular Orifice in a brass plate $\frac{1}{2}$ inch diameter, $\frac{1}{60}$th inch thick.				
4	73	45.7	1 ; .626	At half an inch beyond the orifice, the diameter contracted to 0.37 of an inch.
3	83	52.8	1 ; .633	
2	104	64·6	1 ; .621	
1	144	91.4	1 ; .634	
Circular Orifice in a brass plate $\frac{1}{4}$ inch diameter, $\frac{1}{60}$th inch thick.				
4	276	182 9	1 ; .662	At a quarter of an inch beyond the orifice, the diameter contracted to one
3	320	211.8	1 ; .660	
2	396	258.6	1 ; .653	

N.B. Each result shows the mean of four experiments.

Remarks.

The phenomena relative to the form and direction of veins of spouting fluids, and the remarkable inversion of the fluid veins at certain distances from their orifices, have been so fully noticed in "Experiences sur la Forme et sur la Direction des Veins et des Courans d'Eau; par George Bidone; Turin, 1829," that it is unnecessary to state further than that they have been completely corroborated in the foregoing experiments.

(To be continued.)

Novel Inventions.

Fumigating Apparatus.

A philosophical instrument maker in Bristol, named Braham, has lately constructed a simple apparatus, to be employed for the purpose of fumigating hospitals, ships, and the apartments of sick people, and other places impregnated with foul and deleterious vapours; and for rendering the atmosphere in such places pure and fit for healthy respiration: a subject which cannot be too strongly recommended to the attention of the public in these days of alarm and apprehension, as the most effectual means of preventing the spread of those internal disorders that are now so prevalent under the general title of Cholera, and which in all probability arise from the impure state of the atmosphere in certain localities, more than from any contagious influence.

The apparatus is intended to be carried about the apartment in the hand. It consists of a cylindrical box of tin, about the size of a dark lanthern with a handle behind to carry it by, and an opening in front, through which a small spirit-lamp is to be introduced into the

box and reservoir resting on the bottom. In the opening or mouth of the box at top, a small flask or glass retort is placed, containing a small quantity of chemical mixture, which by the heat of the lamp below is made to distil, and consequently to throw off a vapour, the properties of which are calculated to decompose any putrid matter that may be floating in the atmosphere, and also to supply oxygen, which is the great supporter of life.

This apparatus is so compact and simple in its construction, that it may be taken from place to place in the pocket may be introduced into the most confined recesses of an apartment with perfect ease—is in operation in less than a minute after lighting the lamp—gives out in a very short time sufficient gas to purify any moderately sized room, and in cost does not exceed two or three shillings.

Metallic Hone.

A metallic cylinder for sharpening razors, surgical instruments, and pen-knives, invented it is said by T. A. Knight, Esq. President of the Horticultural Society, has lately been manufactured by Mr. Huntly, of Regent's Circus, and is highly spoken of as perfectly effective and much more convenient than an oil stone, answering all the purposes of a hone, and rendering a strop unnecessary.

This instrument is a cylindrical rod of steel, about a quarter of an inch thick, and five inches long. It is rendered perfectly smooth in the first instance, while in its soft state, and is the worked into extremely fine longitudinal lines, by means of fine emery or glass paper, previous to the steel being hardened. It has a silver or plated knob at the top end, by which it is to be held when in use, and when out of use, it is slipped into a cylindrical sheath, as a guard to its surface.

In using this instrument for sharpening the finer kinds of cutlery, such as razors, its surface is to be first moist-

ened with a small quantity of sweet oil and a little rotten stone, or rouge, or indeed any kind of extremely fine grit is to be powdered upon it. The razor being then held perfectly flat upon the surface of the cylinder, is to be worked about in the same way as on a hone; and if the edge of the razor has not been previously rounded by careless setting, the fine lines and the powder upon the steel will very soon bring it to a beautiful smooth cutting edge.

The simplicity and convenience of this instrument is a great recommendation to it, and the cost it appears is as low as from two shillings and sixpence upwards.

APPENDIX

To the Report of the Select Committee of the House of Commons, on Patents.

Papers delivered in by John Farey, Esq.

[*British Law of Patents for Inventions.*]

(Continued from page 167.)

J. Williams against J. T. B. Williams, his Wife and another, in Chancery. An application to dissolve an Injunction previously issued by the Vice-Chancellor, to restrain the Defendants from divulging the secret composition of certain Medicines for curing Diseases in the Eye, and from preparing or vending those medicines. Heard 6th August 1817. Injunction dissolved.

The plaintiff had stated that he was the sole owner of the recipes of the medicine, which he had made and sold for many years; that he communicated the secret to his son, the defendant, and had put him in possession of his shop, and stock of medicines, with the intention of taking him into partnership when of age, under certain conditions; but those conditions not being fulfilled, and the

son threatening to expose the secret, the father applied to the court, and obtained the injunction to restrain defendants from proceeding.—The son denied that it was any secret to him, when the communication was made by his father, for that he had been instructed in it in early life, by his mother, who had derived the secret from another, and had communicated it to her husband, the plaintiff.

Lord Chancellor Eldon. "The court was regular in granting the injunction, so far as to restrain the son from selling the articles put into his possession by his father, in the confidence of a treaty for his becoming a partner when of age; for if that did not take place, he was bound to return the articles. But so far as the injunction goes to restrain the son from communicating the secret, upon general principles, I do not think the court ought to struggle to protect this sort of secret in medicine. The court is bound to protect patentees, but that is because they have published their secrets. But whether in the exercise of its jurisdiction, to decree the specific performance of agreements, the court ought to restrain a party from divulging a secret discovery, that he has promised to keep, is a question that would require very great consideration. In this case it is denied that there is any secret, and there appears no ground to support the injunction."

Canham against Jones, in Chancery. An application to the Vice Chancellor to restrain Defendant from making and selling a Medicine called Velno's Vegetable Syrup, of which Plaintiff claimed to be the sole Proprietor. Heard before Sir Thomas Plumer, who refused the application, on the ground that the Plaintiff had no exclusive property in the Medicine.

Isaac Swainson had purchased the secret or recipe for preparing the medicine for £.600, thirty years before his death, and he continued all that time the sole proprietor and maker; by his will he bequeathed it to plaintiff, who continued to make and sell the same preparation. Defendant had lately began to sell a medicine, under the same name.

Sir Thomas Plumer, Vice Chancellor. It is an erroneous notion, that there is an exclusive property now subsisting in this medicine, or that Swainson having purchased the secret, and disposed of it by will, had a power to give the plaintiff an exclusive right of sale. If such a claim of monopoly could be obtained without any limitation of time, it would be a much better right than that of a patentee. Nor do the acts of the defendant fall within the cases in which the court has restrained a fraudulent attempt by one man to invade another's property, by representing himself and his trade or productions, to be that other person's, in order to appropriate the benefit of a valuable interest in the nature of good will, consisting in the character of the trade or productions established by the individual merit of another.

The King against Metcalf. A scire facias to repeal Metcalf's Patent of 1816, for a Tapered Hair or Head Brush. Tried in the King's Bench before Lord Ellenborough, after Michaelmas Term 1817. Verdict for the Crown.

The specification directed hairs or bristles of the lengths of an inch, and of an inch and a quarter, to be mixed up together, in each of the clusters, which is afterwards to be doubled, and inserted into a hole in the stock of the brush, and fastened therein by a brass wire, whereby the ends of the brisles in each cluster will be of unequal lengths, instead of being all cut down to the same length; as was before done for hair brushes, the same as for clothes brushes, and other brushes.

Lord Ellenborough. "Tapering means gradually converging to a point; according to the specification the bristles would be of unequal length, but there would be no tapering. If that word be used in its general sense, the description is defective; if the term has, by usage of trade, a different meaning, it may be received in its perverted sense; but I cannot hold out any prospect that the difficulty arising from the grammatical consideration can be removed." After some further evidence, which did not remove the difficulty, his lordship advised the jury to find that it was not a tapering, but only an unequal brush. Verdict for the Crown. Motion was made next term for a new trial, but was refused.

Metcalf's hair brushes, with the central bristles of each cluster projecting out beyond the others around the same cluster, have since come into general use; they penetrate the hair much better than those with all the bristles of an equal length.

Hill against Thompson and Forman, in Chancery. An application to dissolve an Injunction previously granted to restrain Defendants from violating Hill's Patent of 1814, for Improvements in the Smelting and Working of Iron. Heard 24th April 1817. Injunction dissolved.

Lord Chancellor Eldon: When an injunction is applied for ex-parte, on the ground of violation of a patent right, it is incumbent on the applicant to make affidavit, that at the time of application, he is, in his belief, the original inventor; for although he might honestly have sworn to that effect when he applied for his patent, yet information may have afterwards been communicated, sufficient to convince him, that he had been under a mistaken.

Where there has been an exclusive possession of some duration, under a patent right, the court will interpose its injunction, without putting the party previously to establish the validity of his patent at law. But where the patent is but recent, and it is contended that the patent is not good, the court will not, from its own notions, act upon the presumed validity or invalidity of the patent; but will require the patentee to establish the validity of his patent in a court of law, before it will grant an injunction.

In this case it cannot be said that there has been such a possession, or enjoyment under the patent, as ought to induce the court to continue the injunction, until the validity has been tried at law. The injunction was dissolved, but an account was ordered to be kept of the iron made with slags by defendants according to the method in the specification.—Merivale's Chancery Reports, Vol. III. p. 622.

Hill against Thompson and Forman. An action directed by the Lord Chancellor as above, to try the validity of Hill's Patent of 1814, for Improvements in the Smelting and Working of Iron. Tried in the Common Pleas, at Westminster, after Michaelmas 1817, before Mr. Justice Dallas.] Verdict for the Patentee; but Nonsuit was afterwards entered.

The invention was for extracting iron from slags and scoria, which were formerly useless and thrown away as refuse. This was effected by smelting such slags in mixture with certain proportions of limestone, and mine rubbish, or the substance in which iron stones are usually found. Another part of the invention was, the use and application of lime to iron, during its treatment in the furnaces subsequently to the operation of the blast furnace, in order to prevent the quality of coldshort in the iron, that is, brittleness when cold. It was proved that the processes were valuable improvements; but that slags and mine rubbish had been occasionally smelted together before; and also, that lime had been used to prevent cold-short. It was contended, that the mere regulation of principles known before, and practised, would not support the patent; and also, that its title was too loose and general.

Mr. Justice Dallas left it to the jury to say, whether the plaintiff had made out the novelty of the improvements; viz. the conversion of slags into good bar iron, and the prevention of the quality called cold-short by the application of lime. They found for the plaintiff, one shilling damages.—Holt's Reports Nisi Prius, Vol. I. p. 636. Taunton's Reports, Vol. VIII. p. 375. Bayley Moore's Reports, Vol. II. 448.

On the 15th December, 1817, another application was made to the Court of Chancery, in consequence of the above Verdict, to revive the Injunction; but it was deferred by the Lord Chancellor until the result of an application to the Court of Common Pleas, for a new Trial, should be known.

The Lord Chancellor Eldon: After a trial at law, if the patentee is successful, he may apply here to revive the injunction; or else the other party may come before this court, and say, I have displaced all his pretensions, and am entitled to have my costs and expenses of being brought here upon allegation of right, which cannot be supported. But in this case I see enough of difficulty and uncertainty in the specification, and enough of apparent repugnance between the specification and the patent itself, that I

cannot take it for granted, that no argument can prevail upon the court of law, to let the question be reconsidered by a new trial; hence it must stand over till the result of the intended application for a new trial is known, an account of the iron made by defendants being taken in the mean time as before.

The words used by the Lord Chancellor on this occasion, respecting what is required in a specification, were cited by Mr. Justice Best on the trial Brunton v. Hawkes in 1821.

On the 1st June, 1818, the Court of Common Pleas heard the arguments for a Nonsuit, or a new Trial. A judgment of Nonsuit was entered.

Mr. Justice Dallas delivered the judgment of the court. It is not contended that this is a patent for introducing into use, any one of the articles, slags, lime rubbish, or lime, taken singly, but that it is for combinations and proportions, producing a new effect, by a series of processes unknown before. A slight departure from the specification for the purpose of evasion only, would be a fraud upon the patent; but from the evidence, it appeared that the defendant's mode of working was very materially differeut from the specification; and our opinion is, that considering the evidence with reference to the peculiar nature of the patent, the infringement is not proved.

"Every patent must stand either on the ground of an improvement invented, or on the ground of a discovery of something altogether new, and the patent must distinguish itself acordingly. If it is taken out for discovery, when the alleged discovery is merely an addition or improvement, it will be altogether void. The grounds of novelty and discovery. on which this patent must stand, are three. If the discovery claimed were known and used before, the patent is void. I mean to distinguish between the terms novelty and discovery; for it is not enough to have discovered what was unknown to others before, if the dlscovery be covfined to the knowlege of the party having made it; but it must have been communicated more or less to others, or it must have been more or less made use of, to constitute previous discovery, as applied to subjects of this sort.

"The two cases of Dollond and of Tennant stand contrasted to illustrate this distinction. In Dollond's case the question was, who was the true inventor, within the meaning of the statute? Hall had made the discovery before in his closet, but never made it public, and on this ground Dollond's patent was confirmed. In Tennant's case, a bleacher had used the inventiou before, but had kept it secret, except from his two partners and two servants; the basis of the improvement had also been previously suggested to Tennant by a chemist, in conversation. Under these circumstances, he was not deemed to be the inventor, and was nonsuited.

"In Arkwright's case, the idea of drawing out the fibres of cotton between rollers, had been communicated to him by a man, whom he employed in cousequence, to make models for him, before the patent; also the crank and comb, for stripping the cotton off the carding cylinder had been uscd before. Mr. Justice Buller was of opinion, Bat although there might have been a general ignorance of these improvements at the time of the patent, the previous knowledge and use by a few, rendered the patent void."

In the present case there is evidence, stating that the invention is a combination of processes known before separately, but in combination new, and producing a beneficial result; but this is only negative evidence, which merely proves, that those particular witnesses did not know of the method before; and, on the other hand, not only knowledge, but extensive use has been proved, of slags, mine rubbish and lime, as used in various ways; hence there is positive testimony against negative, leaving a result of perfect consistency.

As to the specified combination and proportions of slags and mine rubbish, and lime, considered with a view to utility, the defendants in their working have varied in combination, and departed from the proportions. If the specific combination may be materially departed from, what is there beyond general combination in this patent, which professes to be precise and specific in appointment and application. The use of lime to prevent cold-short is claimed as an improvement, and nothing is said of any previous use, of which this proposed use is averred to be an improvement; but the specification says, "I have dicovered that the addition of lime will prevent the quality called cold-short," which, with what follows, is a claim of discovery in its most extensive sense. A book published in 1807 was produced, and negatives the novelty of the alleged discovery, and it was proved to have been practised years ago, as far as the general application of lime, without reference to specific appointment.

If any part of the alleged discovery, being a material part, fail (the discovery in its entirety forming one entire consideration,) the patent is altogether void. In every view of the subject, the claim to novelty fails, not only virtually and technically, as the patent and specification are framed, but in effect and substance, and in the broadest and most enlarged view of the subject.

At the time of the trial, the utility of the alleged discovery being admitted, the fairness of the specification established, and the publicity afforded by the patent, compared with the partial and previous limited use, giving to the public, as it appeared to me, all but the benefit of actual and original discovery, constituted a case so far favourable to the patentee; but looking to the strictness with which, in point of discovery, patents must be construed, looking to the decisions in cases of the nearest analogy, and to

the peculiar nature of the case, we feel bound to decide against the originality of that which is claimed by the patentee as new. On both grounds, therefore, that no infringement has been proved, and that the invention is not new, we are of opinion that a nonsuit must be entered. An application was afterwards made, to direct a new trial, instead of the nonsuit, but it was refused.

This case was cited by Lord Chief Justice Abbott on the trial of Brunton v. Hawkes, in 1821; also by Mr. Justice Best, as a patent which was set aside for claiming too much.

The King against Wheeler. A scire facias to repeal Wheeler's Patent of 1817, for "a New or Improved Method of Drying and Preparing Malt." Tried in the King's Bench after Michaelmas 1818, before Chief Justice Abbott. Verdict for the Crown. The patent cancelled and repealed.

The Judge thought, that "the title of the patent showed, that it was obtained for a different thing than that stated in the specification; the patent being for preparing malt, which must mean making it from barley, whereas the specification appeared to be for drying malt already made. It was also defective, in not stating the purposes to which the article when prepared, was to be applied, (viz. colouring beer and porter,) nor in describing the process with sufficient precision. These questions arising upon written instruments, and being therefore properly a question of law, the Judge directed a verdict for the Crown.

Motion being made the next term for a new trial, Chief Justice Abbott gave the opinion of the court, viz. for himself, Mr. Justice Bayley and Mr. Justice Holroyd, in February 1819.

"The language in which the supposed invention is described in a patent, is that of the patentee himself; he represents to the Crown that he has invented the thing, and that he is the first and sole inventor; the Crown, yielding to his representation, and being willing to encourage inventions, that may be for the public good, grants him the sole privilege for a time, under specified conditions. If the patentee has not invented the thing of which he represented himself to be the inventor, the consideration of the grant fails, and it becomes void, even if he has invented some other thing, which, upon a due representation thereof, would have entitled him to a grant. The word 'manufactures,' in the statute 21 James I. has been generally understood to denote either a thing made, which is useful for its own sake and vendible as such; as a medicine, a stove, a telescope, &c. or to mean an engine or instrument, or some part of an engine or instrument, to be employed either in the making of some previously known article, or in some useful purpose, as a stocking-frame, or a steam-engine for raising water from mines: or it may perhaps extend also to a new process to be carried on by known implements, or elements, acting upon known substances, and ultimately producing some

other known substance, but producing it in a cheaper or more expeditious manner, or of a better and more useful kind. But no merely philosophical or abstract principle can answer to the word manufactures, Something of a corporeal and substantive nature, that can be made by man, from the matters subjected to his art and skill; or at least some new mode of employing practically his art and skill, is requisite to satisfy that word. He who applies for a patent, may represent himself to be the inventor of some new engine, or instrument, or of a new method of accomplishing the object which is to be accomplished by that new engine or instrument. Thus Mr. Watt represented himself to be the inventor of a new method of lessening the consumption of steam in fire-engines; and by his specification, described certain parts to be used in the construction of fire-engines. Or supposing a new process to be the lawful subject of a patent, he may represent himself to be the inventor of a new process, in which case the word 'method,' may be properly used, as synonomous with process. The language of the patent may be explained and reduced to certainty by the specification: but the patent must not represent him to be the inventor of one thing, and the specification show him to be the inventor of another; because perhaps, if he had represented himself the inventor of that other, it might have been well known that the thing was of no use, or was in common use, and he might not have obtained the grant."

The patentee, Wheeler, represented himself to be the inventor "of a New or Improved Method of Drying and Preparing Malt." Malt was an article of common use, and prepared by a process; of which drying was one of the last stages; we must suppose, by reading the patent, that he had invented some new process of preparing, or drying, this old article; but looking at the specification, we find he claims a method by a second and additional process, and a high degree of heat giving to malt, when previously prepared, some qualities which it did not possess before, or only in a slight degree, viz. solubility in water, and colouring that liquor, which last is the object in view. "We think the invention mentioned in this specification, entirely different from that mentioned in the patent." If he had representsd himself to be the inventor of a method of preparing malt, for the purpose of colouring beer and porter, every one reading the specification, would understand that the malt so prepared, was not intended for the common purpose of brewing beer, but was intended for colouring the liquor, and to be used in additiou to common malt. Neither has he described any certain or precise process, which, admitting that there may be a patent for a process only, ought unquestionably to be done. Verdict coufirmed. The patent ordered to be repealed.

Wood against Cockerell. An application to the Lord Chancellor to restrain the Defendants from violating Wood's Patent of

1815, for Spinning Machines; heard 24th August, 1819. The application was refused; the patent right being doubtful, it was left to the chance of being established by a verdict of a jury, if the Patentee chose to proceed at law.

Bloxam and Another, assignees of H. and S. Fourdrinier, bankrupts, against Elliot. An action for infringement of Gamble's patents of 1801 and 1803, for a Machine for making Paper, the terms of which were extended by Act 47 Geo. III. Tried in the King's Bench in 1819. Verdict for the Patentee. See further trials, Bloxam *v.* Elsee, in 1825 and 1827.

Brunton against Hawkes and Co. An Issue, directed by the Lord Chancellor, to try the validity of Brunton's Patent for 1813, for Improvements in the construction of Ships Anchors and Windlasses, and Chain Cables or Moorings. Tried in the King's Bench, after Easter Term, 25th May 1820, before Lord Chief Justice Abbott. Verdict for the Patentee; but a new trial was afterwards granted; on the judgment of the court, that the patent was void; consequently no further proceedings took place.

The infringement was upon the chain cable, of which the great utility and security to shipping was fully proved. The first chain cables were made by Captain Brown, with twisted links, a wrought-iron stay being fixed across the middle of the opening of each link, to keep them from collapsing. The links of Brunton's chain cables were not twisted, but were made in the strongest form, and the stays across the links were made of cast-iron, with broad ends adapted to the sides of the link, and embracing them. This kind of link had come into general use for chain cables, in place of Brown's, who himself had also adopted Brunton's links.

It was contended, that Brunton's link was not a new invention; also, that the anchor was not a new invention: and that the specification was defective in not giving any dimensions for the stay across the link, for it was only represented in the drawing, which is not an instrument in writing, as directed by the patent. The Court overruled the objection, for "if a drawing or figure will enable a workman of competent skill to construct the improvement, it is as good as as any written description." The jury found, that the specification was sufficient, that the chain cable, and the anchor, were both new and useful, and that the defendants had infringed the plaintiff's chain cable. Damages one shilling. The novelty of the windlass was not disputed.

(To be continued.)

New Patents Sealed 1831

To Robert William Sievier, of Southampton Row, in the parish of Saint George, Bloomsbury, in the county of Middlesex, gentleman, for his having invented or discovered certain improvements in the making or manufacturing of cables, ropes, whale fishing and other lines, lathe and rigger bands, bags, and purses, part of which said improved articles are applicable to other useful purposes. — Sealed 1st December, 6 months for Inrolment.

To Cornelius March Payne, of Stratford, in the parish of West Ham, in the county of Essex, silk printer, for his having invented or discovered certain improvements in printing silk, cotton, and other goods or fabrics. 3d December.—6 months.

To Claude Marie Savoye, of Oxford Street, in the county of Middlesex, merchant, for a new invention of which he is in possession, consisting of an improvement or improvements in mills or machines for grinding or reducing grain and other substances.—15th December.—6 months.

To Abraham Adolph Moser, of Canterbury Row, Kennington Road, in the county of Surry, engineer, in consequence of a communication made to him by a certain foreigner residing abroad, for an invention of which he is in possession, of improvements in certain descriptions of fire-arms.—15th December.—6 months.

To Thomas Alcock, of the parish of Claines, in the county of Worcester, lace manufacturer, for his having invented or found out certain improvements in machinery already in use for the manufacture of bobbin-net lace.—15th December.—6 months.

To Isaac Strombom, of Old Broad-street, in the city of London, merchant, for his having invented a medicinal composition or embrocation for the cure, relief, or prevention of external and internal complaints; which composition or embrocation may alone, or with certain alterations, be beneficially used as an internal medicine.—17th December.—6 months.

To Daniel Ledsam, manufacturer, and William Jones, screw manufacturer, both of Birmingham, in the county of Warwick, for their having invented certain improvements in machinery for making pins, rivets, woodscrews, and nails.—22d December.—6 months.

To Henry Gore, of Manchester, machine-maker, for his having invented an improvement in the machine commonly called by spinners "Throstle Frames," and spinning frames; which machines operate by spindles and flyers and bobbin, for spinning or twisting yarn or threads. 22d December.—6 months.

To Pierrepont Greaves, of Chorley, in the county of Lancaster, gentleman, for his having invented or found out a method or methods of making ornamental or fancy cotton yarns and threads applicable to the making, sewing or embroidering of cotton and other fabrics.—22d December.—6 months.

To John Christopher Tobias Kreeft, of Old Bond Street, in the city of London, merchant, in consequence of a communication made to him by Stephen Von Keesz and Moritz Von Ischoffen, foreigners, residing abroad, for an invention of which he is in possession, of an improved apparatus for shaping plates of metal, and for manufacturing various articles therefrom.—22d December.—6 months.

To Samuel Hall, of Basford, in the county of Nottingham, cotton manufacturer, for his having invented an im-

proved piston and valve for steam, gas, and other engines; also an improved method of lubricating the pistons, piston rods, and valves or cocks of such engines, and of condensing the steam and supplying water to the boilers of such steam engines as are wrought by a vacuum produced by condensation.—22d December.—6 months.

To Benedict Nott, Esq. of Liverpool, in consequence of a communication made to him by a certain foreigner, residing abroad, for an invention of which he is in possession, of certain improvements in the construction of a furnace or furnaces for generating heat, and in the apparatus for the application of heat to various useful purposes, being further improvements upon a patent obtained by the said Benedict Nott; dated the 4th day of November, 1830.—22d December.—6 month.

To Malcom Muir, of Hutchinson Town, Glasgow, Scotland, engineer, for his having invented or discovered certain improvements in machinery or apparatus for preparing boards for flooring and other purposes.—22d December.—6 months.

To Robert Walker Wingfield, of Birmingham, in the county of Warwick, brass founder, for his having invented certain improvements in the construction of bedsteads; one or more of which said improvements is or are likewise applicable to other articles.—22d December. 6 months.

NEWTON AND BERRY,
Office for Patents.

Chancery Lane, London.

Meteorological Journal, 1831.

1831.	Thermo. Hig.	Thermo. Low	Barometer. High.	Barometer. Low.	Rain in inches.	1831.	Thermo. Hig.	Thermo. Low	Barometer. Hig.	Barometer. Low.	Rain in inches.
Oct.						Nov.					
26	57	46	29,54	29,48	,025	11	53	43	30,20	30,15	,225
27	57	46	29,78	29,66	,225	12	53	45	30,19	30,14	
28	57	43	30,09	30,00	,2	13	53	43	30,08	30,00	
29	58	40	30,22	30,18		14	43	24	30,02	29,85	
30	53	33	30,17	30,14		15	41	27	29,46	29,37	
31	49	43	30,13	30,80		16	35	27	29,35	29,26	
Nov.											
1	57	42	29,99	29,84		17	41	22	29,58	29,51	
2	52	45	29,72	29,66	,2	18	41	23	29,65	29,60	
3	52	39	29,52	29,42		19	41	24	29,52	29,46	,15
4	49	28	29,74	29,66		20	41	27	29,80	29,61	
5	47	31	29,51	29,36		21	57	31	29, 74	29,58	,5
6	53	29	29,43	29,36	,1	22	58	50	29,91	29,76	,2
7	51	39	29,51	29,39	,075	23	58	50	29,93	29,91	,05
8	49	38	29,69	29,56		24	54	43	29,97	29,96	
9	47	27	30,26	30,04		25	54	42	29,86	29,83	
10	45	22	30,32	30,16							

1831.	Thermo Hig.	Thermo Low	Barometer. Hig	Barometer. Low.	Rain in inches.	1831.	Thermo. Hig.	Thermo. Low	Barometer. Hig.	Barometer. Low.	Rain in inches.
Nov.						Dec.					
26	54	28	30,10	29,91		11	55	39	29,47	29,35	,025
27	41	28	30,32	30,10		12	54	40	29,33	29,16	,1
28	37	22	30,38	Stat.		13	53	42	29,48	29,32	,2
29	41	27	30,44	30,42		14	48	33	29,60	29,55	,025
30	46	25	30,93	30,09		15	46	33	29,73	29,64	
Dec.						16	46	29	29,79	29,76	,05
1	48	33	30,09	30,02	,1	17	45	30	29,65	29,59	,225
2	48	40	29,99	29,96		18	46	38	29,39	29,30	,3
4	48	39	30,05	39,02		19	44	31	29,60	29,49	
5	51	39	29,96	59,86		29	43	29	29,63	29,58	
6	50	40	29,80	29,56		21	45	32	29,76	29,56	,15
6	51	39	29,42	29.38		22	46	26	29,75	29,53	
7	53	43	29,99	29,90	,05	23	30	26	29,71	20,55	,025
8	55	43	29,22	29,15	,175	24	37	24	29,94	29,81	
9	55	46	29,20	29,10	,425	25	31	21	32,24	30,07	
10	54	43	29,43	29,32	,3						

CELESTIAL PHENOMENA, FOR JANUARY, 1832.

D.	H.	M.	S.	
1	0	0	0	Clock before the ☉ 3 min. 35 sec.
1	0	0	0	♉ Stationary
2	15	12	0	Ecliptic conj. or ● new m.
3	20	0	0	☽ in conj. with ☿ lon. 26. in Sag. ☽ lat. 1. 30 N. ☿ lat. 1. 12. diff. of lat. 18
4	9	0	0	♀ in conj. with ϑ in Libra
5	0	0	0	Clock before the ☉ 5 min. 27 sec.
5	3	0	0	☽ in conj. with ϑ in Caps.
5	6	0	0	☽ in conj. with ♅ long. 25. in Caps. ☽ lat. 2 N. ♅ lat. 39 S. diff. of lat. 41.
6	3	0	0	☽ in conj. with ♃ long. 24. in Cap. ☽ lat. 1. 1. S. ♃ lat. 54 S. diff. of lat. 7.
8	0	0	0	♀ in conj. with ν in Scorpio.
10	0	0	0	Clock before the ☉ 7 min. 37 sec.
10	12	50	0	☽ in □ or first quarter
11	16	0	0	☽ in conj. with 2 ξ in Ceti
12	19	0	0	☽ in conj. with f in Taurus
13	1	0	0	☿ in conj. with d in Sag.
13	16	0	0	☽ in conj. with 1 ϑ in Taurus
15	0	0	0	Clock before the ☉ 9 min. 33 sec.
16	6	0	0	☽ in conj. with ξ in Gemini
17	3	53	0	Eclip. oppon. or ○ full m.
17	20	0	0	☾ in conj with δ in Cancer
18	17	0	0	♂ in conj. with B in Oph
19	5	0	0	☾ in conj. with α in Leo
20	0	0	0	Clock before the ☉ 11 min. 11 sec.
20	10	0	0	☾ in conj. with ♄ long. 13, in Leo. ☾ lat. 2 46 N. ♄ lat. 2. 1 N. diff. of lat. 44.
20	11	29	0	☉ enters Aquarius
21	0	0	0	♉ Stationary near 1 ξ in Sagit.
22	19	0	0	♀ in conj. with ρ in Orph.
24	5	3	0	☾ in □ last quarter
25	18	0	0	☾ in conj. with γ in Libra.
26	5	0	0	☾ in conj. with λ in Libra.
26	22	0	0	☾ in conj. with φ in Orph.
28	23	0	0	☾ in conj. with 1 μ in Sag.
29	3	0	9	☿ in conj. with π in Sag
30	0	0	0	Clock before the ☉ 13 min. 33 sec
30	4	0	0	☾ in conj. with ♉ long. 15 in Sag. ☾ lat. 2. 27. N. ♉ lat. 1. 14. diff. of lat. 1. 13

The waxing moon ☽.—the waning moon ☾

J. LEWTHWAITE.
Rotherhithe.

THE

London

JOURNAL OF ARTS AND SCIENCES.

No. XLVII.

[SECOND SERIES.]

Recent Patents.

To Richard Roberts, *of Manchester, in the county of Lancaster, civil engineer, for his having invented or found out a certain improvement, or certain improvements in the mechanism employed to render self-acting, the machines known by the names of mule, billy, jenny, jack-frame or stretching frame, and all other machines of that class, whether the said machines be made to rove, slub, or spin cotton, or other fibrous substances.* [Sealed 1st July, 1830.]

The particular object of this invention is to communicate to the spindles varying speeds, which shall enable them at all times to take up or wind on the yarn with uniform tension, although the cop may differ materially in its diameter at the several parts of the operation.

The machinery being driven by the power of steam, must possess in itself that regulating property which shall

effect the different adjustments usually performed by the hands of a skilful spinner, and this it appears the Patentee has accomplished in the present invention with greater success than any of his predecessors who have attempted the like object. The following is the Patentee's description of the invention:—

"The nature of my said invention consists of an improvement or improvements in the mechanism employed to render self-acting the machines commonly known by the names of mule, billy, jenny, jack-frame, stretching frame, and all other machines of that class, whether used to rove, slub, or spin cotton, or other fibrous substances, the particular object of which improvement or improvements is to effect in a more complete manner than has hitherto been done by self-acting machines of the kinds above mentioned, the regular winding on of the yarn, or roving, upon the spindles, by regulating their rotary motions according to the gradually varying form and increasing diameter of the cop."

In Plate XII. several parts of a mule are represented, which are not described, such as the carriage wheels, the carriage rail, the going-in scroll and cord, the fallers, and part of the framing. These parts, as well as some of those which are described, are well known to persons conversant with mules and other machines of the same class, and are merely introduced, in order to explain better the nature of the improvement.

"In figs. 1 and 2, *a, a,* is a mule carriage in two parts, one on each side of the headstock, the parts being firmly united by *b, b,* a connecting bar of iron, and *c, c,* an iron frame; to this is bolted in front a frame of iron *d,* which at its upper part is supported by *e,* a spur piece, bolted to the bar *b,* and to the frame *d.* On studs in the spur piece are *f, f,* two ratchet tension barrels, to one of

these is fastened *g*, a cord, which after passing over a notch in the spur piece *e*, is wound round and fastened to *h*, a drum or barrel; this has also attached to and coiled round it *i*, another cord, which after passing over *j*, a guide pulley, and a notch in the spur piece, is attached to the other ratchet barrel. A shaft *k*, on which is keyed the drum *h*, has a pinion *l*, working into *m*, the toothed quadrant, which receives an alternating motion on its centre, through an arc of about 90° whilst the carriage runs out and in, that is to say, at every stretch.

" In a groove in the inner arm of the quadrant is *n*, a sliding nut, moved by *o*, a double threaded leading screw, on the lower end of which is keyed *p*, a mitre wheel, gearing with *q*, another mitre wheel, the central stud of which is opposite to the centre of the quadrant. Attached to the back of mitre wheel *q*, is *r*, a pulley, which is turned at intervals by *s*, an endless strap, passing round it, and *t*, a sliding pulley. A weighted lever *u*, called the governor lever, is moveable on a stud in the back part of the carriage frame, and forms the upper jaw of a pair of pincers, the lower jaw being *v*, a stud in the carriage end.

" The lever *u*, when not intended to press upon the stud *v*, is carried by an adjustable nut on the lower end of *w*, a rod connected with the arm of the counter faller; and having free play through a hole in a side projection from the arm of the lever. When in winding on, the tension of the yarn brings the faller wires to nearly the same level, the dropping of the arm of the counter faller allows the lever *u*, to descend till it pinches the endless strap *s*, against the stud, and drags it along as the carriage runs in, until the rise of the counter faller arm again raises the lever, and liberates the strap. The spindles are banded in the ordinary way, and the drums are driven by a band,

which after taking both the grooves in x, the driving pulley, is spliced, instead of passing from the carriage to the twist pulley as in common mules. The pulley x, is keyed on y, an inclined shaft, the upper end of which turns in a swivel collar, and the lower end or foot in an arm of a bell crank.

" During the process of twisting and backing off, the shaft y, receives motion through 1, a mitre wheel, which is keyed near its lower extremity, and is driven by 2, another mitre wheel, fixed on 3, a shaft, on which is also keyed 4, a double grooved driving pulley, receiving motion by an endless band from 5, the twist pulley above. This pulley band passes under a carrier pulley, and over a double grooved carrier pulley, under the driving pulley 4, again over pulley 7, and under pulley 4, round 8, a sliding carrier pulley, under 9, a carrier pulley, and thence to the twist pulley.

" The mitre wheel 1, comes occasionally into gear with 10, another mitre wheel, keyed on 11, a shaft, upon which is also keyed 12, a spur wheel, which gears into 13, another spur wheel, firmly connected to 14, a drum or barrel, which is called the winding-on barrel.

" The diameters of wheels 12 and 13, should be made to give as nearly as possible the proper amount of rotation to the spindles, according to their diameters and those of the warves, the final adjustment being made in the diameter of the barrel 14, the whole being adapted to give so much motion to the spindles, as will cause them to wind on the whole stretch at the first run in.

" There is a cord 15, one end of which is tied to the sliding nut n, in the arm of the quadrant m, and the other made fast to the barrel 14, after having made several coils round it; and 16, is an opposing cord, also coiled round and fastened to the barrel 14, and after passing under 17, a

carrier pulley, and over 18, another carrier pulley, it sustains 19, a counterpoise, which causes the barrel 14, to take up the cord 15, as the carriage recedes from the rollers.

"A lever 20, inclined downwards at both ends, is mounted at its middle upon 21, a tumbler shaft, carrying 22, a fixed vertical arm, which is connected by 23, a link, with the side arm of the bell crank; 24, is a stopping bar, moveable on a stud in the vertical arm of the tumbler shaft, its lower end passing through and abutting by a shoulder against the upper side of a mortice hole in 25, a stopping piece, which is bolted to the frame *c*; the stopping bar is held against the upper side of the slot by 26, a spiral spring; 27, is a latch, on a stud in a projection from the frame *c*, which is pressed by 28, a spring, in the direction of a catch on one side of the lever 20; 29, is a radial weight, moveable on a stud in the framing, and carrying on a stud near its centre 30, a friction roller, under which the inner inclined arm of the lever 20, passes, and raises the weight a little, just before the carriage completes its run inwards; 31, a stud in the framing, which by stopping the latch 27, in its motion inwards, disengages the lever 20, at the instant the carriage has completed its run; which allows the weight 29, to depress the inner arm, and so to throw into gear the mitre wheels 1, and 2, preparatory to the re-commencement of twisting; 32, is another radial weight, similar to the weight 29, having a friction roller, under which the outer arm of lever 20, comes to raise it, as the carriage reaches its outward limit.

"When the process of backing off is completed, the mechanism for putting up, or running the carriage in is put into gear, and simultaneously with it; and by the same or any other convenient means, the stopping bar 24, is depressed, and the weight 32, depressing the lever 20,

shifts the mitre wheel 1, from the wheel 2, into gear with the wheel 10.

"The diagram fig. 3, is intended to shew the arrangement of the connecting wheels, the winding on barrel, and the crooked lever, when the spindles are driven by bands from a roller, instead of drums, which, as far as the present improvement or improvements in the mule, billy, jenny, jack frame, or stretching frame, are concerned, is almost the only difference in the several machines enumerated; they all being machines of the same class, that is, in which is performed at intervals the winding on of the stretches of yarn or rovings, though used for different purposes, and distinguished by different names.

"A spur wheel *a*, is keyed on the coupling shaft which connects the spindle band rollers on each side of the headstock; *b*, is a radial arm, centred on the same coupling shaft and connected by *c*, a link, with *d*, the crooked lever, which is acted upon by the radial weights and catches, as described before; *e*, a double grooved pulley, keyed on the same shaft with *f*, a spur wheel; *g*, a double grooved carrier pulley, round which and the pulley *e*, the twist pulley band is passed twice, as before explained; *h*, the winding on drum, keyed on the same shaft as *i*, a spur wheel; *j*, a spur wheel, carried by the radial arm *b*, and gearing into wheel *f*, whilst the twist is being given, and into wheel *i*, during the winding on.

"In the adaptation of the present improvements to the mule, billy, jenny, jack frame, or stretching frame, according to the diameter of the cop to be formed, or the length of stretch made in the several machines, it may be requisite to vary the length of the grooved arm of the quadrant. Whilst the carriage is running in, it turns by the band *g*, fig. 2, the drum *h*, its shaft *k*, and the pinion *l*, which works into the quadrant *m*. When the quadrant

begins to move, its grooved arm stands about 12° beyond the vertical position from the rollers, and during its action, it turns on its centre inwards, through an arc of about 90°

"At the commencement of a set of cops, the stud in the nut *n*, to which the cord 15, is attached, is set opposite or nearly so, to the centre of the quadrant, in which position it suffers no change of place by the motion of the quadrant. As the carriage recedes from the point of attachment of cord 15, it causes the rotation of the winding on drum 14, round which the cord is coiled, and the drum, through the train of wheels 13, 12, 10, and 1, that of the pulley *x*, which by the spindle drums gives motion to the spindles, (see fig. 1.)

"The rotation of the spindles during the first run in of the carriage, just suffices to wind on the stretch of yarn upon the bare spindles. As the diameter of the cop increases by each succeeding layer, fewer revolutions will be requisite to effect the winding on of the constant length, and therefore the whole quantity of motion imparted to the spindles during a run in, must undergo progressive diminution, so long as the diameter of the cop is increasing, which goes on until the bottom is formed. This decrease of motion in the spindles is obtained by lessening the quantity of cord to be uncoiled from the winding on barrel; an effect which results from the advance of the nut *n*, along the arm of the quadrant, the amount of the effect being exactly commensurate with this advance, as is apparent when the grooved arm of the quadrant, at the end of the run in, nearly coincides with the line of traction of the cord 15.

"The motion which slides the nut along the quadrant arm is produced in this way. During the process of backing off, the spiral coils of yarn are unwound from the ends of the spindles, and the faller is depressed when the counter

faller by its weight rises, and takes up the uncoiled or slack yarn, and thus the faller wires keep up the tension as the yarn is uncoiling. Whilst the carriage is running in, the spindles, in winding on the stretch of yarn, take up by degrees the coil yarn also, and as this is effected, the faller wires are brought to nearly the same level. At the first run in, this approach of the faller wires takes place only as the carriage comes up to the rollers. The power of winding on increasing as the diameter of the cop enlarges in the subsequent stretches, the coil yarn gets taken up before the carriage has run home; and when this occurs, the descent of the counter faller allows the governor lever *u*, to fall, and to pinch the endless strap *s*, against the stud *v*. With the motion of the carriage the strap is dragged along, and turns the leading screw *o*, which slides the nut *n*, towards the circumference of the quadrant.

"The strap continues to be dragged until the retardation of the taking up from the diminished velocity of the spindles thus produced, permits the counter faller again to rise, and relieve the strap from the pinch of the lever. In this way the nut *n*, is made to advance upon the quadrant arm, in proportion as the expanding diameter of the cop accelerates the action of winding on, and a correspondent abatement in the whole number of revolutions of the spindles is the result. As soon as the cop has attained its full diameter, that is, when the bottom is formed, the winding on power then remaining uniform, the governor lever is no longer made to act upon the strap, and, consequently, the nut *n*, travels no farther from the centre of the quadrant during the completion of the cop.

Besides the adjustment of the whole amount of winding on motion, each stretch is adjusted to the growing diameter of the cop, which is effected by causing the point of attach-

ment of the drag cord 15, to advance progressively upon the rim of the barrel 14. The grooved arm of the quadrant by carrying the point of attachment of the cord 15, after the first stretch through an arc of about 90° at each run in, causes the cord to be uncoiled from the barrel 14, by a ratio increasing as the carriage recedes from the quadrant, and this variable rotation of the barrel is increased by the successive shifts of the nut *n*, from the centre of the quadrant, thus adapting the rotation of the spindles to the winding on powers of the cop, through its various diameters from the base to the summit of the cone.

Having now described my improved mechanism for adapting the rotation of the spindles to the regular taking up of the yarn or roving, as the form and diameter of the cop changes throughout the operation of winding on, I do hereby declare, that my invention consists in the method or means to be employed for that purpose hereinbefore described. The mechanism thus employed by me affects the rotation of the spindles in two ways; first, rotatory motion is given to a drum or barrel, which turns the spindles whilst the carriage is running in, by uncoiling from it a portion of a cord, strap, or chain, attached to the drum, and having its other extremity fastened at some point in a radial arm which describes an arc, whilst the winding on drum is receding from the point of attachment of the cord in a right line. This compound motion adjusts the rotation of the spindles to the varying power of taking up by the conical cop as the yarn or roving is being coiled on its different diameters, during the winding on of each stretch.

Secondly, during the progress of the formation of a cop, the situation of the point of attachment of the uncoiled end of the cord, strap, or chain, on the radial arm is changed progressively, as the increasing bulk of the cop demands

fewer revolutions of the spindles to take up the stretch, and, consequently, there is a shorter length of the cord to be uncoiled from the barrel. And I declare that I claim as my invention, the mechanism or combination of mechanical movements requisite for producing the above stated effects, which I have herein fully set forth, however the arrangement may vary from that now described; and I further declare, that I do not claim as of my invention such parts of the mule and other machines of that class herein described, as act in aid of, or in concert with my present improvements, which have heretofore been in common use in similar machines; nor do I include in my present claim for invention, the action of the fallers, which has been described and claimed by me in the specification of a former patent, granted me by his late Majesty King George the Fourth, and dated at Westminster, 29th March 1825; (see Vol. XIII. Page 6, of the First Series of our Journal).—[*Inrolled in the Inrolment Office,* 1831.]

To AUGUSTUS GRAHAM, *a citizen of the United States of North America, but now residing in West Street, Finsbury, in the city of London, gentleman, in consequence of a communication made to him by a certain foreigner residing abroad, for certain improvements in the application of springs to carriages.*—[Sealed 17th December, 1830.]

THE object of this invention is to furnish the means of suspending coach bodies and other vehicles, in such a manner that the vibratory motions to which they are subject when travelling, by the ordinary modes of hanging, may be in a great measure diminished, if not totally prevented. The springs of the carriage may be of the usual kind, that is, of hardened steel, or elastic wood,

and they may be either attached to the perch or to the body of the carriage, or to both; but between the end of the spring and its place of attachment, a pulley and axle is introduced, with straps or chains for connecting them together, the intention of which is, that the pulley at the point of suspension may turn upon its axis, and thereby take up that portion of the vibratory action to which the body of the carriage is subjected when passing over inequalities on the road.

These pullies are proposed to be made with pivots or axles, turning in holes at the extremities of the brackets, or crane-necked supports affixed to the body or perch of the carriage, and they are to be formed by either concentric or excentric rollers of different diameters; or levers of different lengths may be affixed to the rotary axles instead of the pullies, one end of the suspension straps or chain being attached to the end of such levers, and the other to the body of the vehicle, or to the end of the spring.

In order to exhibit examples of this contrivance, the Patentee has appended drawings to his specification, shewing the forms and modes of connecting the parts. Plate XII. fig. 4, is a side view of the body and perch of a phæton, with the connections and pullies; *a, a,* are the crane-necked supports fixed to the perch *b, b,* the axles turning in eyes or holes near the extremities of the crane-necks. Where there are springs on both sides of the carriage, as there usually are, at the back part, there are two double pullies *c, d,* of different diameters, affixed to the axle, the constructions of which are shewn in the detached figures 5 and 6; but where only one spring is used, as is sometimes the case in front of the carriage, then the larger pulley is proposed to he placed in the middle, and two of the smaller at the ends.

To the peripheries of these pullies *c*, and *d*, the suspension straps are attached as in fig. 5, which represent a pair of concentric pullies, and fig. 6, a pair of excentric pullies. The strap *e*, passes from the under part of the carriage to the periphery of the smaller pulley *c*, and the strap *f*, from the periphery of the larger pulley *d*, to the end of the spring.

In cases where it may be preferred to employ levers instead of pullies, as shewn in the side view of a phæton, fig. 9, then the levers *g*, *g*, are to have arms of dissimilar lengths, and to be suspended at the fulcrum points upon pivots or axles turning in the brackets *h*, *h*, affixed to the under side of the carriage body; the ends of the shorter arms of the levers being connected to the crane-necked supports *i*, *i*, which are affixed to the perch of the carriage, and the end of the longer arms of the levers to the springs *k*. When only one spring is employed, which is frequently the case in front, then the longer arm of the lever must be placed in the middle of the axle, and the two shorter arms one near each end.

In the conclusion of the specification, the Patentee says—"Having thus shewn and described several methods of carrying the said invention into effect, I hereby declare that it is not my intention to limit or confine myself to the employment of those methods only, but to avail myself of every other mode or method by which the said invention of applying springs to carriages by the introduction of axles may be effected, either with excentric or concentric wheels, or pullies of different diameters affixed upon them, or with arms or levers mounted upon the said axles of different lengths.

"And I also claim the application of springs, either to the bodies, or perches, or frame work of carriages, and either in the methods herein shewn and described, or in

any other mode where the said axles with wheels or pullies of different diameters mounted upon them, or with levers of different lengths are used to apply springs to carriages."—[*Inrolled in the Inrolment Office, June,* 1831.]

To DAVID NAPIER, *of Warren Street, Fitzroy Square, engineer, and* JAMES NAPIER, *and* WILLIAM NAPIER, *of Glasgow, engineers, for their invention of certain improvements in machiney for propelling locomotive carriages.*—[Sealed 4th March, 1831.]

THESE improvements consist, in the first place, in communicating the power of the engines to the wheels of the carriage, by means of belts, straps, or bands of leather, or any other flexible material, which work upon pullies or drums; the one fixed upon a shaft connected to the engine; the other upon the wheels or axle; the second is in the peculiar construction of the boiler.

Plate XIII. fig. 1, is an elevation of the locomotive carriage; fig. 2, a horizontal view of the same, the similar letters referring to corresponding parts in both figures; *a, a,* are two steam boilers; *b, b,* the working cylinders of two engines; *c, c,* the framing which carries the boilers and the engines; *d, d,* are the connecting rods, and *e,* the crank shaft of the engines. Upon this crank shaft is fixed the pulley or drum *f,* from which the strap *g,* communicates the power of the engine to the pulley or drum *h,* fixed in the middle of the axle *i,* of the hind wheels *k, k.*

The axle of the fore wheels *l, l,* has a horizontal or locking movement, by its attachments to a horizontal plate or wheel *m.*

The boilers and engines are firmly connected together by the framing *c, c,* which is suspended by helical springs

n, *n*, *n*, from the upper frame work *o*, *o*, which bears upon the axles of the running wheels, and, consequently, have no connection with the carriage but through the springs and the driving belts or bands.

By this arrangement, the engine and all its appendages are relieved from the jolts and vibrations to which the wheels are subjected when running on ordinary roads, and which has been found so extremely detrimental to machinery. The contrivance therefore admits of locomotive engines running on ordinary roads. and may also be adapted to suit railways. The Patentees, however, profess to lay no claim to the particular arrangement of machinery above described, " but merely as above, to the application of the belt, strap or band, made of leather, or any other suitable substance, with either cylindrical or conical rollers or drums, to communicate the power of the engine or engines to the wheels of carriages."

As respects the peculiar construction of boiler proposed, fig. 3, is a horizontal section, shewing the interior with the furnace and flues, and fig. 4, is a vertical section of the same ; *a*, is the furnace, from whence one large flue proceeds to the opposite end *b*, which is hemispherically formed, and from *b*, the flues return through the several small tubes *c*, *c*, *c*, fig. 4, to the front part of the boiler, where they discharge the vapour and smoke into the chimney. The flues are all surrounded by the water, and there is space left at top for the steam, which passes from thence to the working cylinders of the engine.

The Patentees say, that they " lay no claim to the number, size, or form of the tubes or flues that compose the boiler ; they may consist of more or fewer, be larger or smaller, or of whatever form that may suit best the plans of the engineer ; and instead of one main or large tube or flue *a*, it may consist of two or more ; also, the

furnace or furnaces may be either wholly or partially within the main flue or flues, or may be wholly without them, and connected to them; as also, the form of the reservoir or chamber may be varied at pleasure; but what we claim on this head is a reservoir or chamber, into which the flue or flues coming from the furnace or furnaces terminate, and from which reservoir or chamber another set or number of flues commence, and return through the boiler, as stated above, into the chimney or outlet at the furnace end of the boiler."—[*Inrolled in the Inrolment Office, September*, 1831.]

To Richard Witty, *of the township of Hanley, in the county of Stafford, engineer, for his having invented or found out certain improvements in apparatus for making and supplying coal gas for useful purposes.*—[Sealed 10th June, 1828.]

There are two features claimed under this patent; the one is a mode of generating gas from coal, and at the same time burning the gas for the purpose of heating a boiler, while the coke is preserved and drawn off; and the other is a peculiar form of retort for generating gas for the ordinary purposes of illumination.

Plate XII. fig. 8, shews a section of the apparatus to be employed; *a*, is a furnace, which the Patentee considers as a retort; *b*, is a hopper above, to be filled with coals, which are let down from the hopper on to the bottom plate of the retort. Some ignited coke is first to be placed upon the coal through the retort mouth *c*, which is then to be closed as retorts usually are when in operation. The top of the coal being thus ignited, gas will be given off, and that gas immediately becoming inflamed, acts in the flues against the bottom and sides of the boiler

d, where steam is by the heat generated for working an engine, or for any ordinary purpose.

As the coal becomes exhausted of its gas, it is to be gradually pushed forward by screwing up the plate *e*, at the retort mouth, and in so doing, the coke is pushed down the passage *f*, and delivered at the bottom.

Fig. 9, is a transverse section of a retort for generating gas for illumination. The retort is to be made of cast iron as usual, but the particular improvement is what the Patentee calls its V form, or indentation on the top, which not only causes it to last longer in operation, but also to give out more gas than those of the ordinary construction.

The Patentee's claims of novelty are his mode of carbonizing the coal and delivering the coke, and also the peculiar form of retort described, which together constitute the whole of the improvements in apparatus for making and supplying coal gas for useful purposes.—[*Inrolled in the Petty Bag Office, December,* 1828.]

To RICHARD WITTY, *of Basford, in the parish of Wolstanton, in the county of Stafford, engineer, for his having invented or found out certain improvements in apparatus for propelling carriages, boats, or vessels, and for other purposes, by the power of steam.* [Sealed 13th December, 1830].

THE Patentee commences his specification in these words; " instead of applying the power of steam to produce only angular and circular motion for the purpose of propelling carriages, boats, and vessels, in the usual manner, I construct and arrange the working parts of my said steam engine apparatus so as to divide the expansive or elastic force of steam betwixt the piston and the end of

the cylinder, in such a manner as to convert the re-action of the steam upon the end of my cylinder into a projectile force; which force is employed in propelling the carriage, boat, or vessel, forward, or in a rectilinear direction, while, at the same time, the force of the piston itself is employed in producing angular or circular motion, being connected to a wheel or wheels, which are thus turned round, and proceed or move in the line of direction in which the carriage, or boat, or vessel moves."

What the Patentee means by this, we are at a loss to understand. Our notion is, that the ordinary construction of the steam engine is intended to effect precisely the same object, viz. to divide the expansive or elastic force of the steam betwixt the piston and the end of the cylinder, in such a manner as to convert the re-action of the steam from the end of the cylinder upon the piston into a projectile force or first mover, to drive any other kind of machinery; and as to that force being in a rectilinear direction, we are not aware of the possibility of producing a projectile force in any other than a rectilinear direction; it can only become angular or circular by the force impinging upon some resisting medium, which causes it to deviate. For instance, the rectilinear force of the piston being made to impinge in angular directions upon a crank, moves that crank round the axis of its shaft, and thus is derived the rotary motion. If the Patentee fancies he has invented this, or has been the first to discover this as a principle, he is mistaken; if he does not mean this, we are at a loss to discover what he does mean, or in what his invention consists.

The specification goes on to describe a carriage with three single stroke steam engines, the cylinders of which are placed horizontally, and the three piston rods are severally connected to a three-throw crank, with the run-

ning wheels fixed upon the ends of the shaft. The middle cylinder may be made as a double stroke engine, for the convenience of backing the carriage; and the same contrivance is also applicable to propelling boats; but the Patentee disclaims any novelty in the construction of the machinery, and concludes his specification with these words; "I claim the combination of the two principles, viz. angular and rectilinear motion as before produced from the power of steam in giving motion to carriages, either on railways or common roads, and in giving motion to boats or vessels, and for other purposes."—[*Inrolled in the Petty Bag Office, January,* 1831.]

To ROBERT WORNUM, *of Wigmore Street, Cavendish Square, in the county of Middlesex, piana-forte maker, for certain improvements on upright piano-fortes.*—[Sealed 24th July, 1828.]

THE Patentee commences the description of his invention by stating, "The novelty is applied to the lever and the key, and effects a check to the hammer when in action." What may be the object of this is left to be inferred, as the specification throws no further light upon the matter, excepting that it is said "the lever is longer than usual, as may be seen in the drawing," which drawing is an outline sketch of what we presume to be part of the mechanism usually called the action of a piano-forte; but there are no letters of reference by which the several parts alluded to might be pointed out.

It appears that an upright pin is set in the hinder part of the key, and a small block is fixed upon the top of this pin, which, when the key is struck, stops against a piece (we presume called the lever) that stands over it. This is said to simplify the construction of an upright piano-forte, and that is all the account we can give of it. [*Inrolled in the Inrolment Office, January,* 1829.]

To MARIE ELIZABETH ANTOINETTE PERTUIS, *late of Rue de Bal, in the city of Paris, and kingdom of France, spinster, in consequence of a communication made to her by a native of France, for an invention of the fabrication of a coal, fitted for refining and purifying sugar, and other matters.*—[Sealed 23d December, 1830.]

THE clarification of sugar is usually effected by the employment of carbonaceous materials after the dross or molasses has been extracted, and which is applied to bleach and render the saccharine crystallization white, or colourless. The material proposed by the Patentee to be employed for this purpose, is a mixture of animal or vegetable matter, with earth or clay and alkaline salts.

Of the animal or vegetable materials to be used for this purpose, bones, from which the gelatine has been extracted in making glue, is proposed, or coal tar discharged from gas works, or molasses, or blood, or peat, or bark after it has been exhausted by tanners, or any other material which has a carbonaceous base, and can be procured at a small expense; of the earthy matters, clay, river sand, or mud, may be employed; and of the salts, muriate of soda, common salt, or muriatic acid, or lime, or other alkaline salts which are not costly, will answer the purpose.

These materials, in various proportions according to their qualities, are to be mixed together, and after having been dried, are to be calcined and then granulated to about the fineness of gunpowder; they are afterward to be washed repeatedly in water, for the purpose of getting rid of the salt taste; and when that has been completely effected, the compound is fit to be employed in purifying sugar in the same way that carbonaceous matters have been heretofore used for the same purpose.—[*Inrolled in the Petty Bag Office, February,* 1831.]

To JAMES WRIGHT, *of Newcastle-upon-Tyne, soap maker, for his new-invented improvements in condensing the gas or gases produced by the decomposition of muriate of soda and certain other substances, which improvements may also be applied to other purposes.*—[Sealed 28th April, 1829.]

THE Patentee states, that he builds a circular wall of from four to six feet in height, and of what diameter may be deemed necessary for the extent of the operation; the wall, forming a chamber, is to be covered over with a roof or dome, having one outlet in the centre, for the purpose of conducting the gas away, which will be best understood by reference to the drawing shewn in Plate XIII. at fig. 5.

The bottom part of the circular chamber *a*, is to be lined to the height of about a foot from the ground with lead or other material which will keep it water-tight; and around the chamber are to be erected any convenient number of decomposing and drying furnaces, one of which is represented at *b*. The flues from each of these furnaces lead into the central chamber *a*, so that the gas from all the furnaces is there delivered as a general receptacle.

Into this chamber lime water is to be continually thrown by means of a force-pump and hose, the end of the hose having a perforated cap, which distributes the water horizontally in a shower. This water having previously been impregnated with lime, attracts a great portion of the gas from the furnace, and then settling in the bottom of the chamber, forms a reservoir of lime-water, which greedily absorbs a large portion of the gas when it is in the chamber, and also assists in cooling that portion of the gas which has not become condensed, and thereby renders it in a proper state for the subsequent operations.

The uncondensed gas passes off from the chamber by the central flue *c*, and proceeds in a horizontal direction toward the chimney *d*; but in its progress passes through the cylindrical vessel *e*, which is lined with lead. Within this cylinder there are many shelves standing radially and parallel to the axis, as shewn by dots; and between each shelf there is an external opening with a cover, for the purpose of introducing a quantity of slacked lime.

The cylinder is made to revolve by any convenient rotary appendage, the ends of the pipe constituting the axle on which it turns, and by this means the lime is continually raised to the highest part of the cylinder, and then let fall; and by thus continually pouring down, keeps the atmosphere within constantly loaded with lime, in a very minute state of division; through this the gas passing in its progress to the chimney, becomes so completely absorbed, that the vapour which ultimately escapes into the chimney will not discolour a test paper if held in it.

Two cylindrical vessels *e*, may be employed, as shewn in the figure, which will render the success of the operation more certain, and allow an opportunity of changing the lime in one, while the other is at work.

The Patentee claims as his invention, "the application of lime for absorbing the muriatic gas, and this particular mode of application;" and adds, that "the resulting muriate of soda, is an article of considerable importance in the arts, and may be sold at such a price as will nearly cover the expense of the operation."

The other objects to which the Patentee says his invention is applicable are, first, absorbing the sulphuretted hydrogen gas drawn off from the reverberatory furnaces in which the soap-maker calcines his neutral salts, technically called black ash: a process so extremely offensive

that it is obliged usually to be carried on in remote places, at considerable distances from towns.

In this adaptation of the invention, retorts may be substituted in place of the furnaces in the drawing; and the same results will be produced, enabling the soap-maker to carry on all his operations in the same premises, although they may be situate in the centre of a town or city.

Secondly, the invention is applicable to the more perfect purification of coal gas. The gases, as they come from the retorts, being passed through the chamber and cylinders, where the lime is in so complete a state of division, and presenting such a constant succession of surfaces, that the whole of the sulphuretted hydrogen is absorbed, leaving the carburetted hydrogen in a state of great purity. To obviate the chance of any escape of gas at the pivots of the cylinders, it is only necessary to keep the balance of the gas-meter equal to or greater than its own weight.

Thirdly, the application of the cylinders alone to the manufacture of chlorate of lime, is productive of great advantages. The Patentee says, he decomposes the muriate of soda in one set of retorts, and drives off, by means of heat alone, the oxygen from the black oxide of manganese in another set: the pipes from each terminating in a horizontal main or general receiving pipe, on both ends of which are to be placed any number of revolving cylinders charged with fine lime, which by this method becomes completely saturated. The residuum is in one set of retorts, sulphate of soda without any admixture of sulphate of manganese; and in the other, manganese deprived of a part of its oxygen, which, upon being exposed for a time, in thin strata, to a circulation of atmospheric

air, speedily recovers the oxygen it had lost, and becomes fit for future operations. The manganese, of course, must be used in excess, by which a great saving will be effected, and the chlorate of lime produced of a much superior quality.—[*Inrolled in the Inrolment Office, October*, 1829.]

To WILLIAM WEDD TUXFORD, *of Boston, in the county of Lincoln, miller, for his having invented a machine or apparatus for cleansing or purifying wheat, grain, or other substances.*—[Sealed 6th July, 1830.]

THIS invention consists in the adaptation or combination of a series of sieves, in connection with other machinery, to be driven by the power of water or steam, for cleansing grain by sifting; the apparatus resembling in some degree the corning machinery of a gunpowder mill.

Plate XIII. fig. 6, is a front view of a portion of the apparatus, to which two sieves only are appended, for the purpose of illustrating the contrivance; fig. 7, is a side view of the same; *a*, is the main shaft, placed perpendicularly, and supposed to be driven by water or steam; *b*, is a drum, fixed upon the main shaft, from which a band *c*, passes to a small rigger *d*, fixed on the spindle or crank shaft *e*, and a similar band proceeds from thence to the rigger of the second spindle, and so on. This spindle turns in a step below, and in a bearing or loop above, secured to the framing *f*, *f*.

The crank *g*, at the top of the spindle, works in a cross frame fixed to the bottom of the box *h*, in which the sieve *i*, is placed; and the sieve is suspended by three swing rods *k*, *k*, *k*, from a ring or hoop *l*, affixed to the top beam *m*. The corn or other grain intended to be cleansed, is placed on the floor *n*, above the machinery;

and it is passed through an aperture down the pipe or trunk *o*, into the sieve, the quantity, of course, being regulated by a slider in the aperture.

Rotary motion being communicated to the drum *b*, all the spindles *e, e*, are driven round, which causes their cranks to give to the boxes *h, h*, and sieves *i, i*, rapid vibratory movements, as shewn by dots, which shifts the grain in the sieve *i*, carrying the dirt and small seeds through the wire gauze into the box *h*, beneath; and the sieve being upon a slight inclination, the grain will be progressively conducted to the lower side, and by that means made to descend through a small hopper into the receiver *p*; while the dirt and seeds collected in the box *h*, will fall into the small bag or sleeve *q*; and may be removed from thence, when necessary, by untying the end of the bag. It will be found that the lighter parts, such as the husks and shells, will rise to the top of the grain while sifting; these must be removed by hand; and when the process is required to be stopped, a handle and shaft *r*, is to be turned, which shuts off the supply of grain from the trunk *o*; and if any one of the sieves are required to be put out of action, that is done by removing the driving band from the rigger or pulley *d*, upon its crank shaft *e*.

In conclusion the Patentee says, I would have it understood, that although I have here described parts of my apparatus or machinery which separately are well known and in use, yet I lay no claim to them separately; but I claim the combination of such parts in the manner described, and apply them when so combined, to the purpose of cleansing or purifying wheat, grain, or other substances; and I further claim the acting on sieves suspended as above described, by means of cranks, in the manner above described, and for the purposes above named.—[*Inrolled in theInrolment Office, January,* 1831.]

To John Slater, *of Birmingham, in the county of Warwick, manufacturer of coach springs and axle-trees, for his having invented certain improvements in axle-trees and the boxes for carriage wheels.*—[Sealed 15th December, 1828.]

The subject of this Patent appears to be confined to the manner of making the box of a carriage wheel, without any regard to its form. The Patentee states, that the ends of the axle-trees are to be made in the way shewn in Plate XIII. at fig. 8, with a large hole or recess in its end, represented by dots, for the reception of oil, and with small holes leading therefrom, in order to allow of the oil flowing over the bearing part of the axle; but he afterwards says, his axles may be made with or without this oil chamber.

The box of the wheel is to be made as shewn in the section at fig. 9, with recesses to contain the oil, but to this particular form he does not confine himself; *a, a,* is a shell of brass, made to the shape of the axle; *b, b,* is a wrought iron cylindrical case, fixed on the outside of *a.* The iron case *b,* is to be fitted to the external shape of the shell *a,* and when hot, it is to be passed over the shell *a,* and shrunk on to it.

The Patentee says, he does not confine himself to making the shell *a,* of brass, as it may be of any other suitable material; but he claims to be the first inventor of attaching an external case of wrought iron to the box of the wheel, by shrinking it on in the way described; which contrivance may be employed in making the boxes of carriage wheels, whatever may be the peculiar form of them, or of the axles intended to work within them. [*Inrolled in the Inrolment Office, June,* 1829.]

To Marmaduke Robinson, *of Great George Street, Westminster, navy agent, in consequence of a communication made to him by a certain person residing abroad, for certain improvements in the process of making and purifying sugars.*—[Sealed 5th August, 1830.]

The cane juice which is to be operated upon, being placed in the vessel in which it is to be boiled, finings are to be mixed with the juice, composed, as the Patentee describes it, of a saturation of alum and lime, in the proportion of about two pounds of finings diluted in pure water, to every hundred gallons of juice; which is to be properly stirred up and mixed with the juice.

"I next proceed (says the Patentee) to render the juice perfectly neutral, so that there be no excess of either acid or alkali, and the method which I prefer for so neutralizing the juice, and for ascertaining when the neutralization is perfect, is as follows:—I mix with the juice lime dissolved in water, and made into what is commonly called milk of lime, which should be made sufficiently thin, to allow the undissolved particles of lime to subside, and give to the water the appearance of milk, using such milk of lime in the first instance in small portions, and adding thereto from time to time, until I have ascertained, in the manner and by the experiments hereinafter mentioned, that sufficient milk of lime has been applied.

"After each throwing in or addition of the milk of lime, I carefully examine the liquor with any one of the test papers, commonly used for detecting the presence of acids in liquids, and when this paper has ceased to change colour, I examine the liquor with one of the test papers commonly employed for detecting the presence of alkali

in liquids, in order to ascertain whether too much milk of lime has been applied, in which event I add more of the juice until the last mentioned test paper has ceased to change its colour.

"In this manner I proceed throwing in more milk of lime, or of the juice, according to the indications of the respective test papers, until I have ascertained that no change is perceptible on either, and that therefore the juice is perfectly neutral.

"The liquor being thus rendered neutral, I next proceed to heat it in the vessel, until it has nearly reached the boiling point, taking care however that it does not actually boil; and this I prefer to do in wooden vessels, by means of steam.

"The wooden vessel may be made of any convenient shape and size, and within it is to be fitted a copper worm or pipe, of a size suited to the dimensions of the vessel. The steam should be made to circulate through this worm, which must be fitted with cocks, to regulate the letting on of the steam, and the escape of the waste steam and condensation. This worm pipe is to be so connected with the steam generator, as to admit of the steam passing freely through it.

"After having thus heated the liquor, I discontinue the steam, and then mix a further quantity of the finings, diluted as before, in the proportion of about three pounds of finings to every hundred gallons of juice; and after stirring it up, I examine the liquor in a tumbler or other glass vessel, to observe the rapidity with which the impurities precipitate; and I go on adding further portions of the said finings, until I find that the addition of such finings does not increase the rapidity of the precipitation; from which circumstance I ascertain that a sufficient quantity of the finings has been applied.

"My improvement, so far as regards the application of the finings, consists in the finings being applied to the cane juice itself; but I do declare, that although I have found such application of the finings highly useful in carrying the said improvement into effect, still that such application is not indispensably necessary, and that the said improvements may be carried into effect (although less advantageously) without such application of the finings. I then allow the liquor to remain at rest. The impurities, which by the ordinary mode of operating, remain suspended in the body of the liquor (and are got rid of by skimming during the boiling of the liquor), will then be precipitated to the bottom; and those which, in the ordinary method of operating, float on the surface of the liquor, previously to the boiling, will float in the same manner when the operation is conducted according to the present specification. I allow the liquor to stand till the body of it has become cleared from both these impurities; I then draw it off into the evaporators, so as to allow the pure liquor to pass off, separated from the impurities which have precipitated, as well as from those which float at the top.

"This may be conveniently effected by the means of cocks placed at a convenient height from the bottom of the vessel; the remainder of the liquor is afterwards separately drawn off, together with the impurities, into another vessel, in which I mix with it a small quantity of pure warm water, and allow the mixture to settle; the impurities will then separate themselves from the mixture. As soon as the body of this liquor has become clear, I draw off the clear part from the impurities, as on the former occasion, by means of a cock placed at a convenient distance from the bottom of the last-mentioned

vessel, and add it to the liquor already in the evaporators.

"I claim the benefit of these letters patent, for the above described method of precipitating and separating that portion of the impurities, which, in the ordinary method of operating, remains suspended in the body of the liquor, and is only got rid of by skimming during the process of boiling; and I declare, that although I prefer to all other methods of heating for the present purpose, the method of heating in wooden vessels as before described, yet the precipitation above described may also be effected when other methods of heating are used, provided the cane juice be in other respects treated according to this specification, and provided also, the vessel in which it is intended that the precipitation should take place be cold.

"I next proceed to boil the liquor into syrup or sugar, and I prefer boiling it in vacuo by the application of steam; and in that case I prefer employing what is commonly called high pressure steam, that is to say, steam generated under a pressure of not less than twenty pounds to the square inch; steam of a pressure from twenty to forty pounds to the square inch will fully answer the purpose, but in general cases I would reccommend a pressure of about thirty-five pounds.

"I also declare that this application of high pressure steam to the boiling in vacuo, will be found highly beneficial in the boiling of any saccharine solution, for the purpose of manufacturing refined or other sugars. I apply such steam by means of a vacuum pan formed like Howard's, or any other known vacuum pan, except that there is no contrivance for applying steam to the exterior of the vacuum pan, and except so far as the construction of the vacuum pan is altered by the construction herein-

after described; one or more branch pipes are carried from the steam main, which proceeds from the boiler of a high pressure steam engine; these branch pipes enter the vacuum pan at different heights, and each branch pipe terminates in a worm or coil of pipes, circulating horizontally round the interior of the vacuum pan.

"The worm or coil of pipes, when there are more than one, lie one over the other, but are not in actual contact; it will be convenient to make them all finally terminate and unite within the vacuum pan in one single pipe, by which the condensed water or waste steam is to be discharged. This discharge pipe passes through the bottom of the vacuum pan, and at a convenient distance from it with a common high pressure steam regulating cock, the use of which is well understood.

"The juice or other saccharine solution having been poured into the vacuum pan, and the vacuum having been produced, as in Howard's or any other known method, the high pressure steam is let into the branch pipes, and will circulate through them, and through the worms or coils of pipes in which they terminate, and the condensed water or waste steam will be discharged by the discharge pipe.

"I declare that I claim the benefit of tbese letters patent generally, for the above method of applying the high pressure steam to the boiling in vacuo, both for boiling cane juice and for boiling any saccharine solution for the purpose of manufacturing refined or other sugars.

"With respect to the liquor which has been treated in the method described, in so much of this specification as precedes the directions for boiling by high pressure steam in vacuo, I declare that if from any circumstance it should be found inconvenient to boil in vacuo, the liquor may be boiled in wooden tubes made of any con-

venient size; and by the application of steam in this last case, the tubs should be fitted in the interior with a copper worm, of a size suited to the dimensions of the tubs, through which worm (having the necessary cocks to let on the steam, and allow the condensed water or waste steam to escape), the steam is allowed to circulate.

"The tubs should be placed one higher than the other, in such manner as to admit of the liquor being drawn from one to the other successively, and so into the concentrator, by means of cocks or valves; the sugar when boiled, may be drawn from the concentrator by a cock, valve, or any other convenient means.

"The advantages of boiling in wooden tubs are very considerable, but I declare that I do not claim the benefit of the present letters patent for the boiling in such wooden tubs, and that I greatly prefer the method of boiling in vacuo, and by high pressure steam, as herein-before mentioned; I treat the sugar when boiled by either of the above mentioned methods, in the way now usually practised by sugar boilers, and which it is unnecessary to particularize, and I put such sugar either into hogsheads or moulds, as may be found most convenient.

"And, lastly, I do hereby declare that I claim the benefit of the said letters patent, so granted to me as aforesaid, in respect only, first, of the above described method of purifying cane juice, by precipitating that part of the impurities which, according to the ordinary method, is only got rid of by skimming, during the boiling of the liquor; secondly, of the application of finings to the cane juice; and thirdly, of the application of high pressure steam, to the boiling in vacuo of cane juice, or of the saccharine solutions, for the purpose of manufacturing refined or other sugars. And with re-

spect to all the matters and parts of the operation herein-before described (and which are already well known); I hereby disclaim all title to originality, and I declare that so far as I have described the same, I have done so only for the better explanation of the said improvement."—[*Inrolled in the Inrolment Office, February*, 1832.]

Novel Inventions.

The Thermidryum.—Mr. Samuel Gray, of Princes Street, Leicester Square, surgical instrument maker, has recently invented and introduced to the public a novel apparatus for warming or airing beds, which may also be applied as a sudatory for the purpose of causing extraordinary perspiration in bed, in the event of patients being afflicted with rheumatism, cold, and other complaints of that character. This apparatus is said fully to answer the purpose of a hot air or vapour bath, and as such is strongly recommended to the attention of medical men and the public in general, as its simplicity will render it available without that previous knowledge which the proper administering of a vapour bath requires.

Plate XIII. fig. 10. is a representation of this apparatus, which consists of a spirit lamp *a*, with a wire gauze chimney *b*, having at the top a number of layers of asbestos or wire gauze *c*, to intercept and disperse the heat from the flame of the lamp; *d, d*, is an outer casing or shield, also of wire gauze, which perhaps had better be made with a dome top, to prevent the bed clothes coming into close contact with the chimney of the lamp, as in that case its heat might singe them.

The chimney is mounted on a plate *e*, which screws upon the top of the lamp, and upon this plate is also

fixed the wire supports *f, f,* of the hood or fire shield, and the whole may be removed with the plate, for the purpose of lighting the lamp. When the spirit in the lamp has been set on fire, the chimney and shield must be replaced, as shewn, and the apparatus may then be safely put into the bed, that is, under the bed-clothes, and being so closed in, the air confined under the clothes will become heated to any degree of temperature required, and thereby constitute a hot air bath. This apparatus may be so placed in the bed as to cause the heated air to act upon any particular part of the patient's body or limbs, and will be found to have the most beneficial effects, under proper medical direction.

It appears to us, that if the top of the outer shield were made to take off, any chemical liquid might be placed in an open vessel over the chimney, which would throw off a vapour, and form a perfect vapour bath or fumigator. This would require very little change in the construction of the apparatus, and would be a very desirable modification.

Fire Escape. Mr. Week, brewer, Stockwell, has invented a fire-escape, with which we observe, from the daily press, some very satisfactory experiments were made very recently. It consists of a large sheet of canvass, so disposed as to admit of individuals throwing themselves into it from any height, without the danger of harm.

Improved Lavement Syringe or Stomach Pump.—Mr. Gray has also invented an improvement upon Jukes's stomach pump and lavement syringe, which we consider

to be of great utility. In cases where it may be required to dilute and extract poisons from the stomach, a great inconvenience has been experienced from the liability of the common ball valves becoming choked by any matters that may be drawn from the stomach, which causes considerable delay in the operation, and consequent danger to the patient. This is obviated by the adaptation of a sliding plate valve, which turns upon a pivot in its centre. Plate XIII. fig. 10, shews the general construction of the syringe; *a*, is the pipe, which is commonly called the suction, or the pipe by which the liquor to be injected is drawn from the bowl or basin; *b*, is the aperture by which it is discharged through the tube *c*, into the stomach or bowels; *d*, is the handle of the piston, to be raised and depressed as usual; *e*, is a thumb-piece, by which the apertures of the valves are opened and closed.

Fig. 11, represents upon a larger scale the internal appearance of the plate, which acts upon a similar plate at the bottom of the cylinder of the syringe, constituting the sliding double valve; and fig. 12, is a section of the same, with the entrance and exit apertures. In this figure the aperture for the pipe *a*, is seen open; when by raising the piston, the liquid will flow into the syringe. Now let the thumb-piece, which is attached to the valve plate *f*, be moved, and the valve plate will turn round upon its central pivot, closing the aperture of the entrance pipe *a*, and opening that of the exit pipe *b*, so that the contents of the syringe may be immediately injected into the body of the patient.

When the contents of the stomach or bowels are to be drawn away, the pipe *b*, becomes the suction, the aperture *a*, being closed, the contents of the syringe are discharged through the pipe *a*, by turning the valve plate round by the thumb piece as before described.

Literary and Scientific Intelligence.

Roman Coins. At least five thousand Roman coins of various periods, weighing six and thirty pounds, have been lately found at Silly in France, in the department of Orne. The mode of their discovery was singular: two or three pieces of silver were observed by some labourers to be turned up to the surface of the earth by moles; this induced them to dig, and at the depth of only a foot, they came to a broken vase of red clay filled with the treasure.

The Pine. A pine-tree has been discovered in the Umpqua country, to the southward of the Colombia, the circumference of which is fifty-seven feet, its height two hundred and sixteen feet without branches!

Royal Society of Literature. A meeting of the committee of this Society (in which we feel peculiar interest) took place lately at their new house in St. Margaret's Place, when the various necessary arrangements were made for opening the ensuing session.

New Musical Instrment.—At a recent sitting of the Academy of Science in Paris, M. Cœgnard Latour read a paper on the subject of a new musical instrument of his own invention, which he calls "the Syren" (la Syrine). It is a sort of flute, in which the sonorous vibrations are produced by the action of a current of water, as in the common flute by a current of air.

A Publication entitled "The Mythology of the Hindus," is announced, with notices of various Mountain and Island Tribes, who inhabit the two peninsulas of India, and the neighbouring islands. By Chs. Coleman, Esq.

Fossil Forest discovered near Rome. In the Edinburgh new Philosophical Journal for last month (January), conducted by professor Jameson, there is a notice of an interesting discovery which has been made by a pedestrian tourist, namely that of a fossil under-ground forest, above forty feet in thickness, and extending for several miles along the banks of the Tiber close to Rome. The petrific matter is a calc-sinter, and from the layers of ligneous débries being freely intermixed with volcanic dust, the discoverer of this interesting circumstance thinks there can be little doubt but that this colossal phenomenon was occasioned by an earthquake, of which the memory is lost; probably long prior to the foundation of Rome. It is singular that so curious a fact should have escaped observation for so many ages.

The Gigantic Book.—The following curious and interesting (to the march of science) paragraph appeared in the Literary Gazette lately, translated from *Le Globe* of the 19th ult.:—

"The largest book that ever went to press will appear next year in London. It will be entitled 'the Pantheon of English Heroes.' Every page will be twenty-four feet high, by twelve broad, and the letters will be half a foot long. It has been necessary to construct a machine expressly for the fabrication of a paper. This gigantic work will be printed by means of a steam engine; and

instead of black ink, gold varnish will be used. Only a hundred copies will be struck off; intended as the ornaments of the principle English libraries!!! We consider this to be a French hoax.

Literature and Art.—By a paper just issued, containing lists of the new books and principal engravings published in London during the past year, it appears that the number of new books is about 1100, exclusive of new editions, pamphlets or periodicals; being 50 less than in 1830; the number of engravings is 92, including 50 portraits; the number of engravings published in 1830 was 107, including 49 portraits.

Fire Escape.—One of a very simple construction was lately suggested by Mr. Charles M. Willich, to the Society of Arts. The idea is not new, as blankets have been often used with success; but if the plan pointed out by Mr. W. were adopted, and a system established, many lives might be saved. It consists of a horse-hair net, about 14 feet long, by 8 feet wide. He recommended that every police station should be furnished with one, which on an alarm of fire should be immediately brought to the spot. The manner of using the net is self-evident. There are always a sufficient number of persons present, who would hold it extended. Horse-hair is recommended, on account of its durability and elasticity. A fire escape must be *always* perfect, and at hand speedily, or it is useless.

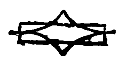
On the Friction and Resistance of Fluids. By George Rennie, Esq., V.P.R.S.

[Read before the Royal Society, June, 1831.]

(*Continued from page* 217.)

Experiments on the Quantities of Water discharged from Rectangular and Triangular Orifices in brass plates one sixtieth of an inch thick, and of equal areas, from a vessel kept constantly full, and at different heights.

TABLE VI.

Height of surface above the centre of orifice.	Time in discharging one cubic foot.	Theoretical time in discharging one cubic foot. $\frac{Q}{2\,A\,\sqrt{g\,H}}$	Ratio of real to theoretical discharge.	Form of orifice.
Equilateral Triangle whose area is one inch, and angle uppermost.				
feet.	secs.	seconds.		Vena contracta about half an inch beyond the orifice; but the jet with the angles reversed, and taking the sides of the triangle, the jet afterwards expanded and lost its form. 
4	15	8.9	1 : .593	
3	18	10.3	1 : .572	
2	22	12.7	1 : .577	
1	30	17.9	1 : .596	
Equilateral Triangle as before, with the angle downwards.				
4	15	8.9	1 : .593	Vena contracta the same as before, but the jet having its angle upwards, being the reverse of the former experiments. 
Rectangular Orifice of one square inch.				
4	15	8.9	1 : .593	Vena contracta about three quarters of an inch beyond the orifice, when each angle of the jet took the place of a side thus, and dissipated in spray. 
3	17	10.3	1 : .606	
2	20	12.7	1 : .635	
1	29	17.9	1 : .617	
Rectangular Orifice 2 inches long, ½ an inch wide, having the long side parallel to the surface of the water.				
4	15	8.9	1 : .593	Vena contracta as before. Each angle of the jet took the place of a side. 
3	17	10.3	1 : .606	
2	20	12.7	1 : .635	
1	29	27.9	1 : .617	
Rectangular Jet 1½ inch long, ⅝ wide, placed as before.				
4	15	8.9	1 : 593	Vena contracta as before. 
3	17	10.3	1 : 606	
2	19	12.7	1: 668	
1	27	17.9	1 : 663	

Remarks.

That with equal areas, the expenditure by different orifices, whether circular, rectangular, or triangular, is nearly the same, the increase being in favour of rectangular orifices.

TABLE VII.

Experiments on the Quantity of Water discharged by Cylindrical Glass Orifices and Tubes, from one inch in length to one foot, and of different diameters, from a vessel kept constantly full, and at different heights.

Height of surface of water above centre of orifice.	Time in seconds in discharging one cubic foot.				Remarks.
	1 inch.	¾ inch.	½ in.	¼ in.	
feet. 4	11.5	24.5	55	145	In comparing these experiments with the time and quantity discharged by plate orifices, there is a diminution of time, and an increased discharge of from one-fifth to ¼.
3	15.0	28.5	63	157	
2	17.5	35.0	77	205	
1	25.0	53.0	110	297	
	From Glass Tubes one foot long.				
	1 inch.	¾ inch.	½ in.	¼ in.	
4	14.0	30	63	200	Shows an increase of time and a diminution of discharge in the ratio of from ½ to ¾.
3	17.0	33	73	227	
2	21.5	40	88	283	
1	30.0	58	130	410	

Conclusions.

1. That the quantities discharged in equal times by orifices and additional tubes, are as the areas of the orifices.

2. That the quantities discharged in equal times by the same additional tubes and orifices under different heads, are nearly as the square roots of the corresponding heights.

3. That the quantities discharged in equal times by the different additional tubes and orifices under different heights, are to one

another in the compound ratio of the areas of the apertures, and of the square roots of the heights.

From the foregoing experiments the mean coefficient for altitudes of 4 feet with the circular orifices, is 0.621

but with altitude of 1 foot the coefficient is 0.645

with triangular orifices at 4 feet altitude 0.593

with triangular orifices at 1 foot altitude 0.596

with rectangular orifices at 4 feet altitude 0.593

with rectangular orifices at 1 foot altitude 0.616

Hence, allowing for the inaccuracies incident to experiments of this nature, we may safely adopt Messrs. Crony and Bossut's coefficients for altitudes of 4 feet 0.621

—— —— 1 foot 0.619

In the case of additional tubes of glass the coefficient is much higher than Bossut's, which was for 4 feet 0.806. and 1 foot 0.817.

Note.—Vide Venturi and Eytelwein's experiments.

Let A = area of orifice in square feet.

d = diameter of srifice if circular.

H = altitude of the fluid in feet.

T = time.

g gravity in one second.

According to Borsut's experiments Q = 0.61938 at $\sqrt{2\,g\mathrm{H}}$.

And as 2 g is a constant quantity, and is equal to 7.77125, we have $Q = 4.818\ A\ T\sqrt{H}$ for orifices of any form, substituting d if circular, or $Q = 3.7842\ d^2 T\sqrt{H}$.

From the second of these quotations we obtain

$$A = \frac{}{48.818\,T\sqrt{H}}\quad T = \frac{}{4.818A\sqrt{H}}\quad \text{and } H = \frac{}{(4.818\,A\,T)^2}.$$

For additional tubes the equation will stand thus: Q=081 $AT\sqrt{2\,g\,H}$; but since 2 g is constant, and is 7.77125, we have $Q = 4.9438\ d^2 T\sqrt{H}$, from which we deduce

$$d = \sqrt{\frac{Q}{4.9438T\sqrt{H}}}\quad T = \frac{Q}{4.9438\ d^2\sqrt{H}}\quad H = \frac{Q}{(4.9438\ d\,T)}^2.$$

Table VIII.

Experiments on the Friction or Quantity of Water discharged by Leaden Pipes of different diameters and lengths, from a vessel kept constantly full, and at different heights.

Pipes 15 feet long each, straight.					
Height of surface of water above centre of pipe.	Time in discharging one cubic foot.				Remarks.
	1 in.	¾ in.	½ in.	No leaden pipes to be had ¼ bore.	
feet.	secs.	secs.	secs.		The time in discharging one cubic foot is nearly double the time occupied by glass tubes of equal lengths and areas.
4	28	54	143		
3	33	63	164		
2	41¼	79	208		
1	61¼	117	312		

Table IX.

Experiments on the Quantities of Water discharged by Leaden Pipes ½ inch bore, but of different lengths from one foot to thirty feet in length.

Glass tubes 1 inch long, ½ inch diam.		Brass orifice ½ diam.	1 foot long.	3f. 9in.	7f. 6in.	11 f. 3 in.	15 ft.	30 ft.
ft.	scs.	secs.	secs.	secs.	secs.	secs.	secs.	secs.
4	55	73	55	78	102	122	143	203
3	63	83	63	92	120	145	164	240
2	77	104	93	113	151	184	208	303
1	110	144	133	170	226	278	312	450

Remarks :—The ratio of discharge by glass tubes with pipes of 30 feet long, is as 1 : 4 - - - nearly.
Ditto with brass orifices, is as 1 : 3 - - nearly.

Conclusions on Pipes of different Lengths.

That the expenditures of water by pipes of equal diameters, but of unequal lengths and under different altitudes, are nearly as follow :—

The length being as 30 to 1, the expenditures are as 3.7 to 1

Do. . . . . 8 to 1 . . . . do. . . . . 2.6 to 1

Do. . . . . 4 to 1 . . . . do. . . . . 2 to 1

Do. . . . . 2 to 1 . . . . do. . . . . 1.4 to 1

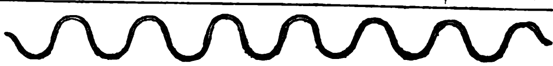
The discharges by glass and leaden tubes are nearly alike. The length of a pipe may be increased from 3 to 4 feet without diminishing the discharge as compared with the plate orifices.

Table X.

The straight pipe of $\frac{1}{2}$ an inch bore, on which the preceding experiments were made, was carefully bent into one, two, aud fourteen semicircular bends respectively, each of $7\frac{1}{2}$ inches in the semi-diameter, and two of $\frac{1}{4}$th part of a circle of $3\frac{1}{4}$ inches radius. One end of the pipe was fixed in the wooden orifice as before, and the following are the results,

Pipe 15 feet long, $\frac{1}{2}$ inch bore, with one semicircular and two $\frac{1}{4}$-circle bends.

Height of surface of water above the centre of orifice.	Time in discharging one cubic foot by a pipe with 3 bends.	Time in discharging one cubic foot by a straight pipe.	*Remarks*: The position of the bends, whether vertical or horizontal, at either extremity of the pipe, does not affect the result.
feet.	secs.	secs.	
4	147	143	
3	175	164	
2	213	208	
1	316	312	



Pipe 15 feet long, $\frac{1}{2}$ inch bore, with 14 semicircular and two $\frac{1}{4}$-circle bends.

	seconds.	seconds.	The expenditure is diminished by the bends from 1-5 to $\frac{1}{3}$, which represents the friction of the pipe.
4	162	143	
3	200	164	
2	247	208	
1	351	212	

Results.

1. That with one semicircular and two $\frac{1}{4}$ of a circle bends, as compared with a straight pipe of equal length and bore, the resistance varies from one-36th to one-70th part of the resistance of the straight pipe.

2. That within fourteen semicircular and two quarters of a circle bends, the resistance varies from one-19th to one-39th of the resistance of a straight pipe.

3. That the increased number of bends does not increase the resistance in the ratio of the number of bends, but merely shows an increased resistance, as compared with the four bends, of one-14th to one-35th.

TABLE XI.

Experiments on the Discharge of Water by Leaden Pipes of ½ an inch bore, 15 feet long, but bent in the forms of from one to twenty-four right angled elbows, each side being 6¾ inches long.

Height of surface of water above centre of orifice.	One right angle 8½ inches from the end of the pipe.	Straight pipe 15 feet long.	Twenty-four right angles.	Remarks.
feet.	secs.	secs.	secs.	
4	180	395	365	In the first three experiments we have a diminution of expenditure in the ratio of 2¼ to 1, and in the last experiment as 3 to 1 nearly.
3	214	465	465	
2	240	584	584	
1	371	872	872	

Conclusions.

From the foregoing experiments with one rectangular pipe, it would be reasonable to conclude that the diminution of discharge would be as the number of right angles; but comparing the expenditure by one right-angled pipe with the expenditure of a pipe with twenty-four right angles, the difference is only in the ratio of about two to one.

General Remarks on the Expenditure of Horizontal and Bent Pipes.

Formulæ adapted to the different circumstances of the motion of water in pipes and conduits have been given by various authors.

By some, the retardations were supposed to be in the inverse ratios of the squares of the lengths of the pipes; and by others, to be represented by a certain portion of the altitude of the reservoir above the centre of the pipe, the resistance being directly as the length and circumference of the pipe, and inversely as the area of the section.

M. Girard, in his beautiful experiments,* conceived the resistance to be compounded of the first and second powers of the velocity. So that, deducing the values from Dubuat's experiments, and expressing the resistance due to cohesion by R x U, R being the quantity to be obtained by experiment, and making the resistance due to the asperities equal to R x U^2, the sum of the resistance is R $(U + U)^2$.

M. Prony, applying his profound acquirements to the solution of all the cases of preceding authors, deduced from a selection of upwards of fifty experiments the following simple formula: —

$$U = 26.70 \sqrt{\frac{DZ}{\lambda}};$$

U being the mean velocity of the section of the pipe;

D the diameter of the pipe;

Z the altitude of the water;

λ the leugth of the pipe:

from which it appears that the velocity is directly in the compound ratio of the square roots of the diameter of the pipe and head of of water, and inversely as the square roots of the length of the pipe; that is, for any given head of water and diameter of pipe, the velocity is inversely as the square root of the length of the pipe.

If we compare these results with those of Dubuat, Girard, and others, they approximate very nearly to each other.

* Memoires des Scavans Etrangers.

In general, if we incline a pipe to an angle of about $6\frac{1}{2}$ degrees, or one ninth of its legnth, the discharge will be nearly equal to the discharge by additional tubes. The charge necessary to express the mean velocity of water issuing from straight pipes is by some authors equal to $\frac{V^2}{478}$;* Dr. Young makes it $\frac{V^2}{550}$; the diminution of expenditure depending upon the contraction of the fluid vein and the friction of the pipe.

The change occasioned by bends and angles in the direction of the fluid vein tends to diminish the velocity in a very remarkable manner.

Dubuat undertook several experiments upon this subject, but the formula proposed by him does not solve the difficulty, where $\frac{V^2 S^2}{m}$ gives the resistance due to one bend, V being the velocity, S the sine of incidence or reflection, and m a constant quantity determined by Dubuat to be 2998.50.

Now although it is reasonable to suppose that the resistance should be proportionable to the squares of the sines of the angles of incidence, yet as all the particles of the fluid vein are not reflected in the same angle, and as a considerable portion of the velocity is destoyed by the first angle or bend the fluid meets with in the pipe, M. Dubuat's theory is fundamentally erroneous, the more especially as he has rejected more than one half of the twenty-five experiments mentioned by him. Dr. Young's suppositions, of the resistance being as the angular flexure and the power of the radius, of which the index is $\frac{7}{8}$, are equally erroneous, as is evinced by the foregoing experiments.

In conclusion, it is evident that the subject of friction admits of an immense variety of applications. To determine the measure of the resistances experienced by vessels and floating bodies in their motion through fluids; the law of the retardations of rivers, and the cause of the obstructions presented to the waves

* DUBUAT and LANGSDORFF.

of the ocean in the slopes assumed by its shores; the equilibrium of earths, and their connections with solids and fluids—all of them are questions of the utmost importance in the economy of nature, and their solution can only be attained by an accumulation of facts.

N. B. Since the foregoing was presented to the Royal Society, an abstract of an extensive series of experiments on the expenditure of water through rectangular orifices of large dimensions, has been submitted to the French Academy by Messrs. Poncelet and Lesbros, of the Corps de Genie at Metz; and as these experiments were undertaken by order of the French government, no expense was spared to have them made as extensive as possible. Their objects were principally to ascertain the exact measure of the coefficient of contraction and the forms of the fluid veins under different altitudes and areas.

The results of which are:—

That with an orifice of 20 centimetres square, the coefficient is 0.600 under altitudes of 1 metre 68 centimetres. But when the altitude was reduced to four or five times the opening of the orifice, the coefficient increased to 0.605, but again diminished rapidly as the altitude diminished, to 0.593.

That with orifices of smaller dimensions, i. e. from 10 to 5 centimetres square, the same law was observed, the coefficient, being respectively 0.611, 0.618, and 0.611, for opening of 10 and for 5 centimetres, 0.618, 0.631, 0.623; and for orifices of less dimension, the coefficient continually increased up to 0.698.

That for water running over weirs, the mean coefficient was 0. 400, which differs very little from that of Bidone.

Hence we see little reason to deviate from the coefficients already given.

APPENDIX

To the Report of the Select Committee of the House of Commons, on Patents.

Papers delivered in by John Farey, Esq.

[*British Law of Patents for Inventions.*]

(Continued from page 227.)

On a motion being afterwards made for a new trial, it was argued before Easter Term 1821, and a new trial granted, on the ground that the patent was void, because the anchor was not a new invention.

Lord Chief Justice Abbott: It is with great reluctance, that my mind has at length come to a conclusion which (as far as my judgment goes) will have the effect of avoiding this patent. It appeared in evidence, that the mode of making chain cables and anchors, introduced by the plaintiff into general use, is highly beneficial to the public, and I wish he could sustain his patent. I feel compelled to say, that the anchor is not new, and that the whole patent is therefore void.

The shank of the anchor is united to the two arms in the same manner as the handle is united to the head of a pick-axe; and that mode of union has been before used, to affix the shanks to the heads of mushroom anchors, and also adze anchors. A patent for a machine, each part of which was in use before, but in which the combination of the different parts is new, and a new result thereby produced, is good: because there is novelty in the construction; but in this case, ships anchors are commonly made of the shank and two arms, united in three pieces; plaintiff forms the two arms in one piece, with a hole through them, to receive the end of the shank, which is put through, and the end rivetted. If the union of those two pieces had been affected in a mode unknown before, as applied in any degree to a similar purpose, I should have thought it a good patent, but unfortunately it was known and practised before. A patent cannot be maintained for uniting two parts instead of three, where the union is effected by a mode known before for a similar purpose. If the patent had been for this anchor alone, I should have had no hesitation in declaring it bad.

As to the chain cable, I think the combination of a link of that particular form, with the stay of the form which the plaintiff uses, although the form of the link might have been known before, is so far new and beneficial as to sustain a patent, if it had been

for that alone: but as one of the articles is not new, the question arises whether any part of the patent can be sustained.

A patent cannot extend beyond the consideration of the grant; the king could not, in consideration of a new invention in one article, grant a patent for that new article and another which was not new. If a party, by representing to the Crown that he has discovered improvements in three things, obtains a patent for the three, and in the result, it turns out that there is no novelty in one one of them, can he sustain his patent? The case of Hill *v.* Thompson is decisive; Hill's patent was for certain improvements in smelting and working iron. The improvement in smelting iron was obtaining bar iron from the slag which had been before thrown away as useless. The improvement in working iron, was the application of lime in certain stages of the process, to cure a disease common to all iron, not merely to that which was to be obtained by the first improvement. It was proved, that the latter was not new, and the Court of Common Pleas held, that admitting there was novelty in one, yet as there was no novelty in the other, the patent was void.

The only difference between that case and the present is, that Brunton, instead of representing that he had made certain improvements, stated what they were applicable to; but he claims the merit of having invented three, and the patent was granted upon consideration of the entirety of the improvement of the three; and if there is no novelty in one, the consideration fails in the whole, and the patentee is not entitled to the benefit of the other. There must therefore be a new trial.

Mr. Justice Bayley: I think there ought to be a new trial. I have no doubt, that if a patent be bad as to part, it is bad as to the whole. When a patent is taken out for several things, the entire discovery of them all, is the consideration on which the grant is made; that consideration is entire; and if it fails in any part, it fails *in toto*. If every part is new, it is a matter of favour in the Crown to make the grant; and it may be, that the discovery of three things together may form the proper subject for a patent, although each *per se* would not; therefore, if any part of the consideratlon fails, the patent is void *in toto*.

If the present patent had been for the chain cable only, I think it would have been good. The improvement in the link is in giiving it such a form as will cause the force of the strain to operate end-ways of the iron of which the link is composed, and applying a bar or stay across the opening, to keep the sides apart, that stay being without the defect of those previously used, which were pointed at the ends, and inserted into holes in the sides of the link; but Brunton's are broad at the ends, and lap round the iron, instead of penetrating into it.

The improvement in ships anchors is making the two arms in

one piece (instead of in two distinct pieces, each to be welded separately to the shank) a hole being left through the middle of one piece, which forms the two arms, to receive the end of the shank. I think a patent cannot be maintained for making in one entire piece that which was before made in two pieces; and plaintiff's mode of uniting the shank to the one piece was used in mushroom anchors and adze anchors; and being so like that used in a pick-axe and hammer, I do not think the mere introducing the shank of the anchor, (which may be called the handle) in so similar a mode, is an invention for which a patent can be sustained. The mushroom anchor and adze anchors, though used as mooring anchors, and not carried with ships, are still ships anchors, and the analogy between them and the plaintiff's is so close, that it does not appear to me that this discovery can be considered so far new, as to be proper ground for a patent; it is nothing more than making in one piece what was before made in two, and introducing the shank into this kind of anchor in the way a handle is introduced into a pick-axe. I think the patent is wholly void, and that there must be a new trial.

Mr. Justice Best: I am of the same opinion. In the case of Hill *v.* Thompson, the Court of Common Pleas, with great reluctance, came to the conclusion, that a patent taken out too large, is void, not only for the excess, but altogether. Respecting this case, the Lord Chancellor had previously said: "The Judge, Mr. Justice Dallas, in his direction to the jury, stated, as the law on patents, that the invention must be novel, useful, and intelligibly described in the specification. I will go further, and say, that the specification must not attempt to cover more than that which, being matter both of actual and useful discovery, is the only proper subject of a patent. If a patentee seeks by his specification any more than he is strictly entitled to, his patent is rendered ineffectual, even to the extent to which he would otherwise have been entitled. A patent may be valid for a new combination of materials previously in use for the same purpose, or for a new method of applying such materials, but the specification must clearly express that it is only for such new combination or application, and not lay claim to the merit of original invention in the use of materials."

When this case was first presented to me, I thought the mooring chain was a new combination of old materials, and that the patent was good; I now doubt that, for the specification cannot stand as a description of a new combination of known principles; it claims the form of the link which is not new; it says, the object to be attained is to get the greatest possible strength from a given quantity of materials; as far as that is to be done by introducing a stay across the link in a new mode, viz. with broad ends, supporting and embracing the sides, it would be new; but he

goes on to say, " that of all forms for the links, that which shall be able to convert a lateral into an end strain, by supporting the opposites sides of the links, is to be preferred:" here I think it claims the merit of originally using links, with stays across, such as have been used long before.

The invention claimed as to the anchor is, that he avoids the welding of the two arms separately to the shank; but his mode of uniting had been used before in the case of mushroom and adze anchors, and in the pick-axe. If he had stated in the specification, that as welding weakens the anchor, he had first applied to the making of ships anchors, that mode of uniting the shank to the two arms, which had been long practised in making other instruments, viz. making the two arms in one piece, instead of two, then it would have been a question whether such an application could be considered a new invention for a patent; but it is unnecessary to consider that question, because he has claimed the mode of avoiding welding, as a new discovery, when it was not new; he has taken his patent for more than he was entitled to, and that avoids the patent *in toto*. The King has been deceived by the representation made by the patentee, that he had the merit of inventing two things, when he had only discovered one: the Crown might have considered the discovery of the two sufficient ground for granting the patent, when the one alone would not have been thought worthy.

In a deed for grant of lands, if it contained three distinct conveyances, of three distinct estates, on three considerations, one might be set aside and another be good; but if the grant were upon one consideration, which was bad, the whole would be void, because the consideration will fail altogether. In this case the consideration to induce the King to grant the patent, was the statement made by the plaintiff in his petition, that he had made three inventions, when in fact he had made only two; the united consideration upon which the whole grant was made, is therefore void, and consequently the grant itself is void. I am of opinion there ought to be a new trial.

Salmon against Hampson. An Action for infringement of Salmon's Patent of 1806, for his self-adjusting Truss, for the relief and cure of Ruptures. Tried in the King's Bench in 1821, before Chief Justice Abbott, Verdict for Plaintiff.

This truss is a most valuable invention, which has proved of the greatest service to many thousands of individuals, afflicted with hernia.

The King against Lodge and Bittleston. A scire facias to repeal their patent of 20th June 1820, for certain improvements in the construction and application of Spring trusses or bandages for the relief and cure of Hernia. Tried in the King's Bench, 25ih

October 1822, before Lord Chief Justice Abbott. Verdict for the Crown.

The proceedings were at the suit of Mr. Salmon, who had obtained a patent in 1811, for an invention, which was proved to be substantially the same as that described in the specification of Lodge and Bittleston's patent.

Hall against Gervas and Francis Boot. An Action for infringement of Hall's patent, 3d November 1817, for a method of improving every kind of Lace or Net. Tried in the King's Bench, 17th December 1822, before Lord Chief Justice Abbott. Verdict for the Patentee.

The invention is to extend the lace net horizontally, and draw it by machinery, with a slow and regular motion, over the flames of gas lights, which flames are urged upwards by a current of air rising through a chimney that is fixed over them, and above the lace, so as to draw the flames upwards through the meshes of the lace, in order to singe and burn away all superfluous fibres from the cotton thread, of which the lace is composed, thereby improving the beauty of the lace very greatly.

The infringement was not proved by very direct evidence: but it was proved, that the defendant had set up the business of bleaching and clear starching lace, and ordered the gas company's pipes to be laid into his workshops to supply a certain number of burners, afterwards the arrangement of the pipes was altered, without any assignable cause, and carried into a part of the shop which was partitioned off, and kept very carefully closed; also, a gas-meter having been applied by the gas company to the entrance pipe, that they might be paid according to the quantity of gas consumed, it was observed, that the consumption was excessive for the professed number of burners, or the size of the shops.

In defence, it was proved, that flame of charcoal, or waste paper, had been long used for singing off the superfluous fibres from lace sleeves, mitts and stockings, but they were always stretched upon a sleeve board, or a wooden leg, during the singing, and the flame was not urged by the draught of a chimney, so as to burn up through the interstices of the lace, in order to singe withinside of the meshes, which is the essence of Mr. Hall's invention. No objection was raised against the specification. Lord Chief Justice Abbott: "There can be no doubt but the verdict mnst pass against both the defendants; one of them has the gas pipe laid into his house."

Barber against Walduck. An action for infringement of Barber's Patent of 1821, for an improved manner of making Hats. Tried at Lancaster in the summer of 1823, before Mr. Justice Holroyd. Patentee nonsuited.

The patentees were hat manufacturers; and one of their men, whom they called as a witness, proved, that he himself invented

the improvement which was the subject of the patent, whilst employed in their workshop. Mentioned on the trial, Bloxam *v.* Elsee, 1825.

Note.—Messrs. Barker and Harris had a patent, in 1821, for improvements in the method of cleaning furs and wools used in the manufacture of hats, from kemps and hairs; it is stated Barber in the above report, by mistake.

Savory against Price. An action for infringement of Savory's Patent of 1815, for a method of making a neutral salt, or powder, possessing all the properties of the medicinal spring at Seidlitz, under the name of Seidlitz Powder. Tried in the Court of King's Bench 17th December 1823, before Chief Justice Abbott. The Patentee was nonsuited.

The specification gave three distinct recipes for preparing the ingredients, and then directed two scruples of each of the three ingredients resulting from those recipes to be dissolved in half a pint of water, in order to produce the imitation of Seidlitz water. It was proved by following the directions given in the specification, the result was obtained, and that it was new and useful. It appeared that the three recipes were only common processes for preparing three well known substances, viz. Rochelle salts, carbonate of soda, and tartaric acid, which were sold in shops before the date of the patent; and those three substances being used as directed, constituted the Patent Seidlitz Powder; the specification did not give any name to the ingredients resulting from the three recipes; but gave those recipes without comment, as if they were part of the method of making the Seidlitz powder.

Lord Chief Justice Abbott: "It is the duty of a patentee to specify the plainest and most easy way of producing that for which the patent is granted, and to make the public acquainted with the mode which he himself adopts. By reading this specification, we are led to suppose a laborious process necessary to the production of the ingredients, when in fact we might go to any chemist's shop and buy the same things ready made. The public are misled by this specification, which tends to make people believe that an elaborate process is essential to the invention; it cannot be supported." The plaintiff was accordingly nonsuited.

Morton against Barclay and others. An action in Scotland, for infringement of Morton's Patent of 1818, for a method of dragging Ships out of water on dry land. Tried in the Jury Court at Edinburgh, 15 March 1824, before the Lord Chief Commissioner, Lord Gillies, and Lord Mitmilly. Verdict for the Patentee. The invention is a substitute for a dry dock for repairing ships. It consists of a horizontal frame or very low carriage with rollers, or small wheels adapted to run upon an inclined plane or slip, such as is commonly used for building ships;

also a strong crane work to drag that carriage up the plane, by a chain, when a ship is placed upon the carriage, which can run down the inclined plane so far under water that the ship can be floated over it. A beam which extends along the middle of the carriage, supports blocks on which the keel of the ship is to rest; and there are several cross beams, on which other blocks are fitted in grooves so as to slide to or from the middle beam, in order to adapt them to block up under the bottom of the vessel, and keep her upright on the carriage: these sliding blocks can be drawn into their places under the bottom, as the vessel settles down on the carriage, after the keel is come to rest on the blocks.

The pursuer erected several such patent slips at various places in England and Scotland under his patents, and the defenders made one near Glasgow in infringement thereof; whereupon the pursuer raised an action in the Court of Session; the defenders, in answer, denied any infringement, alleging that their machine was different from the pursuer's. The question was remitted to the Jury Court, where defenders did not appear, thereby admitting the infringement. The merit and utility of the invention was proved by the testimonies of several naval officers, engineers, and ship builder; several of them taken in writing in England on commission.

The Lord Chief Commissioner made some observations as to the law of Scotland in cases of this nature, and that he thought it would be a desideratum to have the point settled. The pursuer's advocate submitted, that since the Union, the practice in regard to patents was the same in Scotland as in England. The Lord Chief Commissioner said, that as the defenders did not appear, the court must suppose their cause indefensible; he had never seen a case before any court more fully made out than the pursuer's. The practice in England rendered it necessary for the pursuer to make out, 1st. That the invention was original, and was made by the patentee himself; 2nd. That his patent right had been invaded. In this case it had been proved that the invention was original; that it was useful, and preferable to dry docks; that it would be of the utmost utility in places where there was not a rise and fall of tide; that the shipwrights working in the dry, may work longer days than in a dock, and can more conveniently use long planks. With regard to the law in questions of this nature, he would say nothing; he believed that this was the first case which had been brought to trial upon similar issues. No amount of actual damage had been proved, and it was only a question of the right. The jury found a verdict for the pursuer, with one shilling damages and costs.—Printed Notes of the Trial.

Bloxam and another, assignees of H. and S. Fourdrinier, bankrupts, against Elsee. An action for Infringement of Gamble's

Patents of 1801 and 1803, for a Machine for making Paper. Tried in the King's Bench, before Chief Justice Abbott, 18th Jan. 1825. Verdict for the Patentees.

The machine acts by the continuous motion of an endless web of woven wire cloth, circulating over horizontal rollers, and forming a moving horizontal plane, on which the pulp is spread at one end, and during the motion thereof, as the pulp advanced to the other end, it is formed into a tissue of paper, which is taken off in a continuous sheet at the other end of the moving plane.

(To be continued).

New Patents Sealed, 1831, 32.

To John Samuel Dawes, of Bromford, in the parish of West Bromwick, in the county of Stafford, iron master, for his invention of certain improvements in the manufacture of iron.—22d December, 1831, for Inrolment.—6 months.

To John Dickinson, of Nash Mill, in the parish of Abbott's Langley, in the county of Hertford, esq. for his having invented or found out certain improvements in the manufacture of paper.—10th January, 1832.—6 months.

To William Sneath, of Ison Green, Nottingham, lace maker, for his having invented or found out certain improvements in machinery for the manufacture of bobbin net lace.—21st December.—6 months.

To John Lihou, of the Naval Club House, Bond Street, in the county of Middlesex, esq. a commander in our royal navy, for his having found out and invented an improved method of constructing capstans.—10th Jnnuary, 1832.—6 months.

To Moses Teague, of Park End Iron Works, near Calford, in the county of Gloucester, iron master, for his having invented certain improvements in making and smelting pig iron.—17th January.—4 months.

To Elijah Galloway, of Blackfriars Road, in the county of Surrey, engineer, for his having invented certain improvements on paddle wheels.—17th January.—4 months.

CELESTIAL PHENOMENA, for February, 1832.

D.	H.	M.	
1	10	15	⊙ eclipsed invisible
1	10	16	Ecliptic conj. or ● new moon
1	18	0	♀ in conj. with ♂ long. 0. 4. Cap. ♂ 20. S. lat. ♀ 8. N. lat. diff. of lat. 28.
2	0	0	⊙ rises 7 h. 26 m. sets 4 h. 36 m.
2	21	0	☽ in conj. with ♃ lon. 29 in Cap. ☽ lat. 1.35 S. ♃ lat. 54 S. diff. of lat. 41
2	0	0	☿ greatest elongation W. 25 26.
3	17	45	conj. ⊙ and ♅
5	0	0	Clock before the ⊙ 14 m. 19 s
6	0	0	⚳ 22 h. 55 m. R. A. 15. 45. S. dec
6	0	0	Pallas 21 h. 27 m. R. A. 0.57. S. dec
6	0	0	⚵ 10 h. 23 m. R. A. 1. 46. N. dec.
6	0	0	Vesta 8 h. 32 m. R. A. 24. 14. N. dec
8	23	13	☽ in □ first quarter
9	0	0	⊙ rises 7 h. 15 m. sets 4 h. 45 m.
10	0	0	Clock before the ⊙ 14 m. 35 s.
10	5	0	occultation of Aldebaran by the moon's southern limb
13	0	0	☽ in perigle
13	9	0	♀ in conj. with ♆ in Sag
15	0	0	Clock before the ⊙ 14 m. 30 s.
15	0	0	⊙ rises 7 h. 3 min. sets 4 h. 57 m.
15	15	19	Ecliptic oppos. or ○ full m.
16	16	0	☾ in conj. with Regulus occultation under southern limb
16	18	38	☾ in conj. with ♄ long. 12. in Leo. ☾ lat. 2. 38 N. ♄ lat. 2. 6 N. diff. of lat. 32.
17	0	0	☿ in Aphelio
18	21	0	♂ in conj. with ♆ in Sag.
19	2	5	⊙ enters Pisces
20	0	0	Clock before the ⊙ 14 m. 8 s.
20	0	0	⚳ 23 h. 15 m. R. A. 13. 34. S. dec
20	0	0	⚵ 10 h. 12 m. R. A. 3. 55. N. dec
22	0	0	⚶ 8 h. 17 m. 25. 3. N. dec
22	0	0	Pallas 21 h. 48 m. 0. 7. S. dec
23	0	22	☾ in □ last quarter
23	0	0	⊙ rises 6 h. 48 m. sets 5 h. 12 m.
23	12	0	Mer. in conj. with ♅ long. 13. in Cap. Mer. lat. 1. 47 S. ♅ lat. 39 S. diff. of lat. 1. 8
25	0	0	Clock before the ⊙ 13 m. 28 s.
25	10	0	☾ in Apogce
26	0	0	⚵ 10 h. 7 m. R. A. 4. 56. N. dec
26	0	0	⚶ 8 h. 15 m. R. A. 23. 42 N. dec
26	0	0	Pallas 21 h. 53 m. R. A. 0. 7. N. dec
26	0	9	⚳ 23 h. 24 m. R. A. 12. 36. S. dec
27	8	0	Mer. in conj. with ♂ in Cap.
27	13	30	☾ in conj. with ♀ long. 1. 6. ♒ an occultation touching the moon's southern limb ☾ lat. 0. 54. N. ♀ 0. 30. S
29	0	0	⊙ rises 6 h. 36 m. sets 4 h. 24 m.
22	1	0	☾ in conj. with ♅ long. 15 in Cap. ☾ lat. 16 S. ♅ lat. 39 S. diff. of lat. 23
29	20	0	☾ in conj. with Mer. long. 23 in Cap. ☾ lat. 1. 12. S. Mer. lat. 2. 5. S. diff. of lat. 53

Jupiter's satellites not visible this month, owing to the planet being so nearly in the same part of the heavens as the sun.

The waxing moon ☽.—the waning moon ☾

J. LEWTHWAITE,
Rotherhithe.

Meteorological Journal, 1832.

1831.	Thermo. Hig.	Low	Barometer. Hig	Low	Rain in inches.	1832.	Thermo. Hig.	Low	Barometer. Hig.	Low.	Rain in inches
Dec.						Jan.					
26	39	24	30,39	30,35		10	49	36	29,64	29,51	,225
27	40	34	30,33	30,27		11	48	39	29,73	29,61	,025
28	41	30	30,27	30,20		12	46	33	29,72	29,56	,125
29	43	32	30,17	30,12		13	41	35	29,74	29,50	,425
30	41	25	30,34	30,20		14	37	27	30,23	30,03	,025
31	37	22	30,30	30,16		15	36	21	30,38	30,34	
1832. Jan.						16	35	21	30,36	30,32	
1	33	20	30,16	30,12		17	41	30	30,26	30,23	
2	37	21	29,92	29,80		18	42	28	30,26	30,25	
3	32	27	29,76	Stat.		19	34	23	30,26	30,20	
4	32	16	29,68	29,61		20	34	23	30,11	Stat.	
5	30	20	29,63	29,61		21	41	29	30,16	30,07	
6	39	29	29,58	29,42		22	43	32	30,16	30,15	
7	41	33	29,35	29,33		23	42	33	30,24	30,14	
8	40	32	29,39	29,33		24	46	24	30,14	30,09	
9	43	32	29,45	29,37		25	47	37	29,76	29,74	

Edmonton. Charles Henry Adams.

Latitude 51 37—32 N.
Longitude 3—51 West of Greenwich.

It is rather extraordinary that snow has not been found to lie in London once this winter, up to the present time—such has been the mildness of the season.

THE

London

JOURNAL OF ARTS AND SCIENCES.

No. XLVIII.

[SECOND SERIES.]

Original Communications.

On Flying Bridges.

To the Editor of the London Journal of Arts, &c.

Sir,—Flying Bridges are rarely if ever used in this country, because whenever there is any intercourse between the opposite banks of a river, it is generally sufficient to justify the erection of a permanent bridge, and the breadth of our rivers is not in general such as to render the construction of permanent bridges impracticable; moreover, where they are broad, they are seldom rapid enough to prevent a ferry boat from crossing with tolerable ease and expedition.

From their simplicity and cheapness, and the expedition with which they can be constructed, flying bridges are of great use in military operations; they are also very common on the broad and rapid rivers of the continent, and although little used in England, are not undeserving of attention.

A flying bridge is formed by fastening a floating body to the end of a cable or chain, moored in a river, and keeping the body by a rudder, oblique to the direction of the stream; the action of which against the oblique side of the floating body, drives it away towards one of the banks, moving it in an arc of a circle, about the moorings of the cable.

Plate XIV. fig. 1, represents a floating bridge; *a*, a boat fastened by a cable *b*, to a buoy or an anchor at *c*. The current running in the direction of the arrow No. 1, moves the boat *a*, in an arc of a circle about *c*, away from the bank *h*, towards the bank *i*.

The force which urges the boat *a*, in the direction *h*, *i*, depends upon the obliquity of the boat to the current, and is greatest when the side *x*, makes with it an angle, of 54° 44'.*

A bridge of this kind is in use on the Rhine, for crossing opposite Nymuegen. From the bank opposite to Nymuegen, a bridge of boats is built, extending rather more than half across the river. The flying bridge (is a platform or piece of road, laid on a strong barge, to which one end of a chain is made fast; the other end of the chain carried over and fastened to the masts of seven boats, to support its weight, and is moored in the river at some distance up the stream. The barge is steered oblique to the stream, and according to the direction of its obliquity, swings round in an arc of a circle, from the end of the bridge of boats to a jetty on the Nymuegen bank, or *vice versa*. The stream runs about three to three and a half miles an hour.

In very rapid rivers, flying bridges should not be made both to cross and re-cross by the action of the current, for the resistance to the motion of the boat in the ascending part of the arc (viz. in the direction of the arrow,

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* Vide Douglas on Military Bridges, p. 94.

No. 2,) is very great, and the descending force of the stream, to drive the boat down the river, negatives the effect of its oblique action on the boat, to drive it upwards about the moorings of the cable.

In such cases, it is advisable to make the flying bridge move only one way by the current, viz. in a descending arc, and to haul it back by a second cable; thus the boat *a*, fig. 2, crosses to the bank *e*, through a descending arc from the bank *d*, to *e*, taking with her a rope *b*, *c*, by which she is hauled back from *e*, to the bank *d*.

On the other hand, a flying bridge will not act well in a river with a very slow current at the sides, unles jetties or bridges of boats are built out from the banks, some distance into the river, for the flying bridge to come up to, for when the current at the sides is slight, it will not carry the boat close up to the shore.

A flying bridge was established a few years ago across the *Kistna*, in India: the breadth at the part where the bridge was made is between 700 and 800 yards in the rainy season, when the river is full, and the stream then runs in the middle of the river, at about four to four and a half miles per hour. The bed of the river is deep, but the sides shelve up. In the rainy season, when the river was quite full, the flying bridge acted very tolerably; but when the waters were out, the strength of the current at the sides, owing to the extreme shallowness of the water, was insufficient, and the flying boat could not be made to come up to the banks within about 40 yards.

When a river is too wide for a simple flying bridge, two boats may be used, one moving in an arc *c*, *d*, fig. 3, about the centre *a*, and the other in an arc *e*, *f*, about *b*, and a boat or a raft moored in the middle of the river, for shifting the passengers from one boat to the other. Or the raft may be dispensed with, and the cables shifted when the boats come close up to each other; the boat *d*,

being then made fast to the cable *b, e,* and the boat *e,* to the cable *a, d,* so that each boat will go across in two stages from one bank to the other, through *c, d,* and *e, f.*

Sir H. Douglas recommends this plan, in preference to having a raft in the middle (see Douglas on Military Bridges p. 96); we apprehend it might be attended with more danger of the boats fouling and doing injury if the current were very rapid, for both boats would be moving at their greatest speed, just where they would meet, viz. in the middle of the river; and hence the shock, if by accident they were to strike each other, would be twice as great as the shock of one boat against a stationary raft. Also the difficulty of managing them in a rapid current to change the cables, would be considerable, and the operation tedious.

We are not aware whether this plan has been extensively adopted in practice. The other is adopted in effect, and answers very well in the Nymuegen flying bridge; for though it has not two boats, the flying boat comes up to the end of the stationary bridge of boats, nearly in the strongest part of the stream.

In flying bridges the cable should be of a good length; for when it is long, the flying boat moving through the arc of a large circle, has to ascend the stream less than when the cable is short; that is, its direction is nearer to a strait line across the stream; and, consequently, less of the effective force of the current to impel the boat across, is abstracted by the resistance of the current to the ascent of the boat. For instance, in figure 1, with the cable *c, a,* the boat moves upwards, equal to a distance *a, l*; but if the cable were only as long as *c, l,* the boat in crossing, would move through a distance *l, n,* against the stream, which is much greater than *a, l.*

The whole motion of the flying boat from side to side, should not exceed a right angle, and then the angle *a, c, s,*

fig. 1, will not exceed 45°; for when the angle *a, c, s,* exceeds 45°, the force *c, l,* that impels the boat sideways, in opposition to the current, becomes less than the force *l, s,* which holds it to the centre. This is shewn by the triangle *c, n, m,* fig. 1, where the angle *n, c, m,* is more than 45°. The force *n, m,* is greater than the force *c, n,* and the boat would not, in fact rise by the oblique action of the stream so far as *m.*

In narrow rivers, not exceeding two hundred yards in width, and with a tolerably rapid current, a flying bridge may be applied with effect, in the following manner:—

Let a cable be stretched across the river from bank to bank, and attached on each side to a frame secured in the bank, and drawn tight by a windlass; then attach the flying bridge to this cable, by means of a short rope, with a running block on the cable; and by keeping the boat in an oblique direction to the course of the stream, it will be carried across by the force of the current with considerable effect and expedition. This mode of establishing a flying bridge is more easy of adoption than the former one, and is attended with far less expense and trouble, as the buoys for the support of the cable may be dispensed with, and also the anchor for mooring it in the river.

This plan was used, to establish a communication across the Thames at Gravesend, during the threat of invasion from France. The cable was suffered to sink to the bottom, not to interrupt the navigation; and as the boat crossed, the rope rose to the point of suspension on the bank.

The cable should not be sunk when it can be avoided, because the boat has then to move the weight of the rope that connects it to the cable; and, moreover, the running block will run with a great deal more friction upon the wet cable than when it is out of the water.

A triangular raft may be floated over a river, as well

as a boat, if it be connected to a warp, or to a moored cable, in any of the ways we have described, by keeping one of its sides oblique to the direction of the stream.

Another mode has been found to answer well, viz. anchor the cable in the middle of the stream, and pass it over a pier of wood or masonry, built in the river, to the flying bridge on the opposite side of the pier. The bridge is then carried across the stream, if kept oblique to it, by the force of the current acting against its side, without the necessity of using buoys or boats for supporting the cable, which at all times tend greatly to impede the motion of the bridge, because the current acts upon them in an opposite direction to that in which it affects the flying bridge itself, and the latter has therefore in effect to drag the buoys through the water, against a considerable resistance.

When a river exceeds two hundred yards in width, it is necessary to adopt the mode of mooring the end of the cable in the stream, and passing it over buoys, or a pier to support its weight; but where a river is less than two hundred yards wide, the system of causing the flying bridge to traverse the river on a cable stretched across it from bank to bank, may be considered as far preferable in every respect. P.

Novel Cooking Apparatus.

To the Editor of the London Journal of Arts, &c.

Sir,—A cooking apparatus in my kitchen, upon a novel construction, has given so much satisfaction on the score of convenience, economy, and good effect, that I am induced to forward a sketch of the contrivance for your insertion in the *London Journal of Arts*, if you should consider it worth a place among other projects of the day.

Upon a hot hearth, which is prefered to an open fire, is placed the tin vessel that the victuals are to be cooked

in. Plate XV, fig. 1, is a vertical section of this vessel; fig. 2, is a plan or horizontal representation of the same; *a, a,* is the hot hearth; *b, b,* the cooking vessel, which is made of tin plate, without cock or valves. In the centre is the part *c,* in which the joint of meat is steamed, and it is found most convenient to lower it into the vessel upon a fish tray; *e, e, e,* are narrow compartments filled with water, which surround the vessel *c,* on the sides and bottom, and there are passages of communication from these into the wing compartments *f, f,* also filled with water. The steam escapes from *e, e,* through small openings at *g, g,* about one inch wide and two long, and so fills the central part *c,* the whole being closed tightly by covers.

When this apparatus is placed upon the hot hearth, the heat communicates to the boiler by the contact of the bottom, the wings not touching it by about an inch. The vessel will cook, that is steam, from 10 to 20lb. of beef, mutton, fish, or poultry, in a very superior manner to any cooking apparatus that I have before seen; the vegetables which cannot be steamed, without becoming tough and ill coloured, are boiled in the wing vessels *f, f.*

I consider it a great advantage in this vessel, that it will never boil over, or render the meat hard by cooking it too rapidly; it is easily kept clean both within and without, and for making soups, stews, or even coffee, is the best contrivance I have met with. In boiling eggs also in this apparatus, the sulphuretted hydrogen will be disengaged, which is a very desirable object to be effected, it being injurious to delicate stomachs; the eggs must be held in a suitable receptacle and lowered into the vessel in a raw state.

I am, Sir, your's, &c. I. O.

Meteorological Observations in different parts of the kingdom, during the year 1831.

To the Editor of the London Journal of Arts, &c.

Sir,—I send you the following account of Meteorological Observations, taken in different parts of the kingdom, which will I trust be interesting as a matter of comparison to many of your readers: the mode of keeping these registers was as follows:—

At Edmonton, the warmth of the day is observed by means of a thermometer exposed to the North in the shade, standing about four feet above the surface of the ground; the extreme cold of the night is ascertained by a self-registering thermometer in a similar situation; the daily range of the barometer is known from observations made at intervals of four hours each, from eight in the morning till eight in the evening; the weather and direction of the wind are the result of the most frequent observations; the rain is measured every morning at eight o'clock.

At Wycombe, the thermometer and barometer are registered at 8 A. M., at 3 and 10, P. M.; the extreme cold is ascertained by a self-registering thermometer. The wind is set down from the result of the most frequent observations.

At Cheltenham, the temperature is ascertained by a self-registering thermometer, suspended about five feet from the ground, in a North-east aspect, and the observation made daily about 8 o'clock, A. M. The winds and barometer are registered at 8 o'clock, A. M., and 8 o'clock, P. M.

Charles Henry Adams.

GENERAL METEOROLOGICAL REPORT, FOR THE YEAR 1831.

KEPT AT EDMONTON.

MONTH.	Thermometer.				Barometer.				Rain.	WINDS.							
	Highest.	Lowest.	Mean.	Range.	Highest.	Lowest.	Mean.	Range.	In Inches.	N.	S.	E.	W.	N.E.	S.E.	N.W.	S.W.
January..........	50	16	31,9	34	30,5	29,14	29,45	1,36	1,27	3½	—	3	—	9	7½	3½	4½
February.........	62	10	41,22	52	30,3	29,	29,78	1,3	2,95	—	—	½	—	1	4	12	10½
March	61	25	43,80	36	30,32	29,12	29,79	1,2	1,65	—	1	—	1	5	5	6	13
April............	65	27	52,1	38	30,3	29,2	29,63	1,1	1,82	½	2½	2	—	9½	4	8	3½
May	77	20	56,46	57	30,24	29,32	29,88	,92	1,65	1	1	3	½	14	4	3	4½
June............	77	37	60,12	40	30,17	29,56	29,78	,61	1,50	1½	—	—	—	2½	—	10	16
July	82	45	63,56	37	30,26	29,59	29,93	,67	2,62	—	½	2½	½	8	3½	5	11
August...........	79	43	64,48	36	30,21	29,64	29,94	,57	1,5	—	1	—	2	7	½	13½	7
September......	71	37	52,28	34	30,16	29,34	29,89	,82	3,67	1½	—	—	—	1	6	11½	10
October..........	69	33	54,35	36	30,33	29,29	29,82	1,04	4,4	—	—	—	—	1	8½	1	20½
November........	58	22	42,22	36	30,44	29,26	29,82	1,16	1,6	—	—	—	—	2½	1	9	17½
December	55	21	41,67	34	30,39	28,9	29,79	1,49	2,15	—	—	—	—	1	2½	10	17½
YEAR	82	10	5,36	72	30,5	28,9	29,79	1,60	26,80	8	6	11	4	61½	46½	92½	135½

Lat. 51° 37' N. Long. 0° 8' W.W.

Recent Patents.

To Henry Duxbury, *of Pomeroy Street, Kent Road, in the county of Surrey, gentleman, for his having invented a new machine for splitting hides and skins.* [Sealed 9th October, 1828.]

This machine is intended to divide the skins or hides of animals into two thicknesses, each of which may be afterwards separately worked, that is, tanned or dressed, for the purpose of making them into distinct skins of leather or parchment.

The skin intended to be split, is in its raw state, first extended with the flesh side upwards upon the periphery of a wooden roller, and there stretched out tight and smooth, fastening its edges by pins, hooks, or tacks, set round the roller, and by wedges or rods, let into grooves cut in the roller, in the direction of its axis.

The form of the roller is not perfectly cylindrical, but is made concave or hollow in the middle, in order to accommodate itself more correctly to the shape of the skin, and also to fit the edge of the circular cutter which turns round nearly in contact with the roller, as it splits the skin into two thicknesses.

Plate XIV. fig. 4, is a front elevation of the cutting machine; fig. 5, is a side view of the same; *a*, is the roller, on the periphery of which the skin is to be extended; *b*, is the circular cutter, mounted upon an axle, turning on the standards *c*, *c*, which cutter is driven by a band from any first mover passed round the rigger *d*, or by a winch or crank affixed to the axle; fig. 6, is a dia-

gram, shewing in section the roller *a*, with the skin stretched upon it, and the edge of the circular cutter *b*, splitting or separating the skin into two thicknesses.

The circular cutter *b*, being made to revolve, as shewn, a strap from the pulley *e*, upon the axle of *b*, drives a pulley *f*, below, on the shaft of which pulley there is an endless screw *g*, taking into the teeth of a wheel *h*, fixed on the shaft or axle of the roller *a*. Hence it will be seen, that when the circular cutter is made to revolve, the roller *a*, will be slowly turned, which causes the skin to be progressively brought forward to the cutting edge, and thereby split into two thicknesses.

In order that the skin may be conducted smoothly and evenly to the cutter, a guide piece *i*, *i*, is mounted in the frame *c*, *c*, the edge of which fits the form of the roller, and presses upon the skin, as seen in the diagram. That part of the skin which is uppermost, viz, the flesh side, is split away from that which is fastened to the roller, and turning upwards, passes through a slit or long opening *j*, in the guide piece, when it is rolled upon the roller *k*, in a sheet, as it is delivered from the cutter.

For the purpose of accommodating the machine to skins of different thicknesses, the guide piece *i*, *i*, is made to rise and fall in grooves in the standards, which adjustment is effected by drawing up the chains or rods *l*, *l*. The rotation of the roller *a*, may be instantly stopped, if the cutting appears to be irregular, by sliding on one side the clutch box *m*, which connects the roller *a*, and the toothed wheel *h*, together.

For operating upon small skins, it is in the contemplation of the Patentee, to adapt two rollers, each carrying a skin to one rotary cutter, as shewn in the diagram fig. 7; and to suit skins which are of unequal thicknesses, the guide *i*, may be made with many falling pieces, as shewn

at fig. 8, which pieces will severally rise and fall, according to the thickness of the skin under operation.—[*Inrolled in the Inrolment Office, April,* 1829.]

To William Morgan, *of York Terrace, Regent's Park, in the county of Middlesex, Esq. for his having invented certain improvements in steam-engines.* [Sealed 14th February, 1831.]

These improvements are intended to be adapted to those kinds of steam-engines which act upon the rotary principle, having a reciprocating leaf and axles, as that described in the Specification of a Patent, granted to Elisha Galloway, July, 1829, described in the Sixth Vol. of our Second Series, page 193, of which the present Patentee states that he is now the proprietor by purchase.

The improvements proposed, consist in several arrangements of levers and pulleys, constituting modes of converting the reciprocating action of a piston, which pass to and fro through one half a rotation into a rotary power, that is, of giving rotary motion to the axle of a fly wheel, or a propelling wheel, from the vibrations of the reciprocating piston, or leaf and axle of the engine.

Plate XV, fig. 9, shews the first plan proposed; *a*, is a pulley or drum, affixed to the reciprocating shaft of the engine; *b*, is the crank of the axle, which is to be driven round. A chain *c*, is fastened at one end to the periphery of the pulley, and at the other end to a vibrating lever *d*, and a simliar chain *e*, is fastened in like manner to the pulley, and to the lever at opposite points.

When the pulley *a*, by the vibratory action of the engine, turns in the direction of the arrow, the lever *d*,

and the crank, will be brought into the position shewn by dots. When the pulley turns in the reverse direction, the lever and crank will be brought to the opposite part of the dotted circle, and the fly wheel, or propelling wheel, fixed on the crank shaft, will, by its momentum, carry the crank past the dead points, and so by the vibration of the engine at *a*, the shaft *b*, will be made to continue revolving.

Instead of the chains described, the lever *d*, may have a rack formed upon its edge, taking into a toothed segment on the edge of the pulley, which, as the pulley vibrates, will move the lever to and fro, and effect the same object as the chain.

Fig. 10, shews the second plan of converting a reciprocating into a rotary motion; *a*, the axle of the reciprocating engine; *b*, that of the fly wheel, or propelling wheel, which is to be made to revolve; *c*, is a beam or lever, vibrating on a fulcrum pin in its centre. From the axle *a*, a crank *d*, extends, which is connected to the lever by a pin, working in a slot *e*, near the extremity; the reverse end of the lever is by a link *f*, connected to the crank *g*. It will hence be seen, that as the axle of the engine *a*, reciprocates, the crank arm of the shaft *b*, will be driven round, and rotary motion be thereby comm ucated to the shaft.

Fig. 11. is a variation of the last described contrivance, in which, instead of the crank arm *d*, a plate *i, i*, is affixed to the end of the axle of the vibrating engine, having a long groove *k, k*, in which a boss at the end of the beam *c*, acts, and by sliding up and down in this groove, as the plate reciprocates, gives that vibratory action to the beam, which in the preceding instance was effected by the crank arm *d*.

The fourth plan is a combination of levers, shewn at

fig. 12; *a*, is the reciprocating axle of the piston of the engine; *b*, the crank shaft to be driven; *c*, an auxiliary arm, moveable upon a fixed pivot, at the end of which arm the fulcrum of the small lever *d*, is placed. As the crank arm of the axle *a*, vibrates, these levers move into different positions, and by means of the link *e*, drive round the arm and axle *b*.

The fifth contrivance consists in attaching the crank of the shaft, intended to revolve, to a sliding carriage, which is made to reciprocate by its connection to the axle of the engine. This is shewn at fig. 13, in which *a*, is a pulley, fixed on the reciprocating axle of the engine, to which pulley the ends of two chains are attached, in the manner described in the first plan; the reverse ends of these chains are made fast to a sliding carriage *c, c*, which runs upon rollers or wheels *d, d*, in the guide frame *e, e, e*; to the axle of one of these wheels, or to the sliding carraiage, one end of the link *f*, is attached, and the other end of the link is connected to the crank arm of the shaft *b*. As the piston or leaf of the engine reciprocates, the carriage *c*, is driven to and fro, by which means the link *f*, causes the shaft *b*, to revolve.

There is no alteration proposed in the construction of the internal or operative parts of the engine itself, the contrivances above described constituting the subject matter of the invention, which it is said may be adapted to any engine on the reciprocating rotary principle, whose piston does not pass through more than an arc of about half a rotation.—[*Inrolled in the Inrolment Office, August*, 1831.]

To James Viney, *of Piccadilly, in the county of Middlesex, Colonel in the Royal Artillery, for his having invented certain improvements in steam boilers, used in carriages, or apparatus connected therewith.*— [Sealed 2d November, 1829.]

The Patentee states that the first part of his invention consists in certain improvements in steam boilers, viz. in making such boilers of a conical shape. and with circular conical flues; whereby he is enabled to apply the heat of lamps, fed with oil or gas, as effectually as other fuel; which enables him to expose a much more extended surface of fuel, in a given space of boiler, than by any method now in use. The second part of this invention applies to steam carriages connected with the said boilers, in which it is proposed to dispense with the water tank, seperator, blowing box, and the apparatus connected therewith, as now in general use for steam carriages.

In Plate XV. fig. 3, is a horizontal representation of a steam boiler on the proposed plan, consisting of eight steam generators *a, a, a,* &c.; each of which, if made on a large scale, might be considered as a separate steam boiler; but one great advantage of this invention, is the diminitive size of these generators, compared with the extent of heated surface they expose to the water, and which, the Patentee says, enables him to place them in a great variety of positions, to suit the form of engine required. Eight vessels are here described as the number constituting a boiler, and it is only necessary further to observe, as regards this figure, that the top or chimney is supposed to be removed, which would otherwise conceal the position of the generators, for such the Patentee calls each of the small circular boilers shewn in this figure.

Fig. 4, is a vertical section of one of the said generators, drawn on a larger scale for the purpose of better elucidation. Fig. 5, is a horizontal section of the same at bottom; and fig. 6, at top; fig. 7, being an external elevation of the generator, which is cased in with wooden staves and hooped as a barrel; the sides of the generator, it will be observed, are conical, being larger at the top than at the bottom, as *b, b, b,* &c. The parts marked *c, c,* are circular conical flues; and *d,* is a lamp to heat the water in the boiler; the parts marked *e,* are communication pipes, for the steam to pass through, and the parts marked *f,* are similar pipes for the water; *g,* is the top or chimney to receive the smoke (if any,) from the flues; *h,* is the steam pipe, and *i,* is a waste steam pipe, whch conducts the waste steam under a semicircular pipe or gutter, placed over the top of the first compartment, or space between the side of the boiler and the first flue. This gutter is pierced with holes in its upper surface, to admit the waste steam to escape without, the noise that usually accompanies it. It is only necessary to add, that each generator is furnished with safety valves in the ordinary way, and when several are used, as in fig. 3, communication pipes must be added, to connect them in their operation.

The specification concludes in these words, "Now whereas, it is evident that one of these generators made on a large scale, and adapted to be heated by a furnace in the ordinary way, would serve of itself for a boiler, but I prefer a combination of small ones, as shewn in fig. 3, as better adapted to suit the convenience of such irregularly formed boilers, as may be required for particular purposes. And whereas, I claim as my invention, first (as regards my said improvements in steam boilers), the generators with conical sides, and circular formed

flues, herein before described, either combined in any number or in any suitable position, as shewn in fig. or any one of them made on a larger scale as aforesaid, and thus forming one complete boiler of itself. And further (as regards my said improvements in steam carriages, or apparatus connected therewith) I claim the doing away of the tank, seperator, blowing box, and apparatus connected therewith."—[*Inrolled in the Inrolment Office, May*, 1830.]

To ANDREW URE, *of Burton Crescent, in the county of Middlesex, doctor of medicine, for his having invented an apparatus for regulating temperature in vaporization, distillation, and other processes.*—[Sealed 20th October, 1830.]

THIS invention is founded upon the principle of the compensation balances applied to chronometers, which are constructed of two or more long slips, or thin bars of different kinds of metal, connected together by rivets or solder; the several metals having different expansive properties under similar temperatures, and, consequently, by expanding when in connection, bend or warp the compound bar out of its original form or figure. The apparatus is called a Thermostat.

The principle admits of being variously modified in its construction, and may be applied in many different situations, where a varying temperature can act upon it, for the purpose of becoming a self-moving agent. The intention of the Patentee is to adapt this contrivance to distilling apparatus particularly, in order that by its expansion or contraction, it may open or close a water cock, and thereby admit such a regulated current of the cooling fluid, as shall at all times keep the materials under operation at a uniform temperature. The same

contrivances are also applicable to regulating temperature in stoves and heating apparatus of various kinds.

The construction of the proposed apparatus admits of almost as many varieties as its adaptation; the Patentee has exhibited several, merely as illustrations. Plate XV. fig. 8, shews one mode of applying the contrivance; *a*, is a bar, composed of two thicknesses of metal, brass and steel united, and made fast at the end *b*, to the place where it is to be used, which may be called its fulcrum. At the reverse end *c*, a link connects the bar to a lever *d*, which by the rod *e*, raises and depresses a sliding door or damper *f*.

When heat is applied to the compound bar *a*, it elongates, and that metal, which expands most under a given temperature, being uppermost, causes the bar to bend down, as shewn by dots, and by that means to raise the door. If placed within a boiler, the same might open a cock or valve, and on the temperature being lowered, it would rise and close the cock or valve.

Fig. 9, is another modification of the contrivance, consisting of several pairs of compound metallic bows *a, a, a*, connected together, the lower one of which is fixed by an adjustable screw to the bottom of the box *b*, and the upper one to a sliding rod *c*. The outer parts of these bows being composed of metallic bars, which are more readily susceptible of expansion by heat than the inner parts. On the temperature of the surrounding medium becoming increased, the bows rise upon the central pin *d*, and in so doing lift the rod *c*, which having a rack *e*, at its end, turns the circular piece *f*, upon its centre, and thereby opens a ventilator, or turns any other apparatus, by which a cool current may be admitted. When the temperature of the surrounding medium becomes lowered, of course the bows flatten, and come closer together, drawing down the rod *e*, and closing the ventilator.

Fig. 10, shews the Thermostat in a circular form, that is, a hoop *a*, *a*, constructed by uniting two thin slips of dissimilar metals. At the open parts of the hoop two levers *c*, *c*, are attached by joints, and which levers are connected together and to a sliding rod *d*, at the joint *e*.

If this hoop *a*, *a*, be fixed at the part *f*, in a vessel, the varying temperatures of which are required to be known, the different degrees of heat will cause the hoop to expand and contract, and in so doing, to move the arm *g*, upon its fulcrum *h*, which will cause the cock *h*, to open or close the water way of the pipe *i*, leading from a cistern *k*, and by that means to increase or diminish the flow of the cold water from the cistern, according as the heat of the fluid in which the Thermostat is immersed may require it. There is a graduated arc *l*, proposed as a thermometrical scale, to exhibit the temperature which is pointed out by the end of the arm *g*.

Fig. 11, is another modification of the contrivance, designed to be placed within a chimney or flue, for the purpose of opening a damper when the heat becomes too great; *a*, and *b*, are each a compound bar, composed of two dissimilar metals. These bars are fixed in pendant positions at their upper parts, to a stationary bar in the chimney; and when the heat of the flue causes the compound bars to expand, they will so move the levers at *c*, as to open the damper and admit a current of air to cool the parts within. This arrangement is called a Pyrostat

It must be repeated, that these are only illustrations of several constructions and modes of adapting the principle, but the Patentee claims generally the adaptation of combined bars of metal, whose properties render their opposite surfaces susceptible of different degrees of expansibility, under any given temperature, for the purpose of moving levers, or otherwise operating to open or close valves,

cocks, or registers, for regulating the temperatures of fluids, or airs for, refrigerating or ventilating.—[*Inrolled in the Inrolment Office, April,* 1831.]

To Andrew Ure, *of Finsbury Circus, in the county of Middlesex, M. D. for his having invented an improved apparatus for distilling.*—[Sealed 31st March, 1831.]

The object of this improved apparatus for distilling, is that the wine wash, or other fermented liquor, during its passage into the alembic or kettle, shall be most extensively exposed to the hot vapour ascending and descending from the said kettle, in a very thin stream or stratum, on a series of shelves, trays, gutters, or channels, placed over each other. By this exposure to the cool wash, the temperature of the vapour is partly moderated towards the degree most favourable for the production of a fine spirit, and the wash itself is partly stripped of its finer alcholic particles, by a steam distillation, before it reaches the alembic.

The physical principles on which the apparatus is intended to act, may be stated as follows:—Fermented liquor contains three ingredients, all volatile by heat, but at different successive degrees of temperatute; alcohol, essential oil, and water. If a mixture of these three substances in the vaporous state, be passed upwards through tortuous tubes or channels, maintained by any means at a temperature under 160° Fahrenheit, alcoholic vapour alone, in any considerable quantity, will retain its tension or continue to exist, so as to pass onwards into the refrigeratory; if the said channels acquire a temperature of 180° Fahernheit, some essential oil, and steam will accom-

pany the alcohol vapour, and pass onwards with it; and if the channels acquire the temperature of 212° Fahrenheit, the said three volatile matters, will all pass freely into the condenser, so as to constitute a spirituous liquor, more or less crude according to the crudity of the fermented matter.

Now, it is proposed by this exposure of the cool wine, or wash, on an ample series of surface, in the progress of its descent into the alembic, to refrigerate the mixed vapours as much as possible, both by the heating and evaporating of the wine or wash, and to supply whatever additional refrigeration may be desired by the application of water, at a regulated temperature, to the metallic vessel or cases, which contain the said series of shelves, trays, gutters, or channels.

Figs. 12 and 13, represent in section two forms of the moveable frame, or system of moveable shelves, trays, or channels, which constitute a leading feature of the improved apparatus for distilling. The vessel of fig. 12, is cylindrical; that of fig. 13, is rectangular.

In fig. 12, *a*, *a*, represents the section of an exterior cylindric annular space, contained between two metallic cylinders; and *b*, *b*, represents the section of an interior cylindric annular space; each of these spaces is furnished with a series of annular shelves, trays, or channels, standing over one another, at a distance of one inch or more; each of which is perforated with a slit or holes at one part, for the descent of the thin stream or wash, into the subjacent shelf. Across the upper surface of each annular shelf or tray, a vertical ridge is fixed to one side of the slit or holes, so that the liquor being delivered always on the side of the ridge opposite to the said slit or holes, must perform a complete revolution on the shelf, before it can descend into the next shelf, and so on in succession.

These annular shelves have their edges turned up, as shewn in the section which prevents the liquor from escaping over the edges, while it stiffens the flat metallic ring.

The system of shelves for one annular cylindric space, may be conveniently connected by three or four rods passing down them, so as to bolt or solder them together, and permit them to be drawn up easily in one body, for the purpose of cleaning or adjusting at any time.

The fermented liquor is admitted in a regulated stream, into the top shelves through the stop cock *c*, of which the key may be mounted with a graduated arch; or the pipe between the top cock and the ball *d*, may be a graduated glass tube, the height of the liquid column in which will determine the rate of efflux through the two orifices below, which are of different widths, but together much smaller in area than the water-way of the above stop cock.

The top of each cylindrical annular space is covered in by an annular plate, which is secured with bolts and packing, in the usual way. The bottom of each annular space is closed either by a special annular plate, or by a circular plate, including both spaces. The pipe *e*, represents the back of the alembic, which rising with a gentle slope, enters the bottom of each of the cylindric annular spaces, at *f*, *f*, whence it diffuses the vapours freely all around and upward, among the moveable system of annular shelves.

The rectifying cylinder, fig. 12, and its shelves, may be advantageously made of tinned copper, or of lamine of tin, hardened with a copper alloy; but it is desirable to pass the spirituous vapour at last up through one spiral coil of tin plate, as shewn at *g*, *g*; immediately before its entrance into the refrigatory worm in *h*. The tub or back *h*, is filled with water, which bathes the outside

of the rectifying cylinder, as well as the interstices between the concentric cylinders. As this water tends in the progress of distillation to become too hot, especially when a strong alcohol is sought for, its temperature is regulated by the application of a Thermostat, or heat governor, fig. 14, described under several modifications in the specification of a patent for that invention granted to the same Patentee. (See the preceding patent.)

The links *a, a,* connected with the expanding ends of the thermostatic bars *b, b,* act on the stop cock *c,* of a cold water cistern, so that whenever the temperature of the surface water of the bath, in which the said bars are plunged, exceeds the defined degree, a stream of cold water is admitted into the body of the bath through the pipe *d, d,* so as to chill it, and cause the hot water to pass off through the overflow pipe *e.* The screw nut *f,* serves to adjust the length of the rod *g,* so that the stop cock may be opened more or less, at any desired point in the thermostatic bars.

Fig. 13, represents, in a rectangular form, a similar moveable series of shelves or trays, for the extensive exposure of a stream of wine or wash, to the boiling hot vapours, in its descent into the alembic; *a, a, a,* are rectangular cases or hollow parallelopipedons, of which the width is small compared with the length and height. These cases are open at top and bottom, where they are soldered or riveted into a general cavity, enclosed by covers, secured with packing and bolts in the usual way. Each case is furnished with a series of straight shelves or oblong trays, turned up at the edges, and at one end, but slightly sloped at the other for the discharge of the wine or wash into the subjacent shelf. The direction of the stream in each shelf is the reverse of that in the shelf above and below it, as seen in fig. 15; where

the turned up end of one shelf corresponds to the discharge slope of its neighbour. These shelves are framed together, by two or more vertical metallic rods, which pass down through them, and are fixed to each shelf by a screw nut, solder, or otherwise. Hence, when the cover is removed, each set of shelves may be readily lifted out of its compartment and cleaned.

The shelves may be laid in a horizontal position, or with a slight declining in the direction of the stream The cellular intervals between the shelf cases allow a free circulation of the water contained in the external bath cistern *i, i*; the temperature of which is regulated by a heat governor *k*, connected with the stop cock or valve of a cold water back as above described. The wash descends through the main pipe *c*, into the horizontal pipe *h*, which has apertures to allow equal jets of distribution, corresponding to the series of oblong trays, or shelves, shewn in the section fig. 13, and in the plan fig. 16.

Fig. 15, is a side view of one shelf compartment, to shew the to and fro course, and descent of the current of wash in its passage to the alembic. The shelf case may be advantageously made three inches wide, for more ample exposure of the wash or wine, while the water cell is only one inch; for this body of water will easily control the temperature of that body of vapours.

In some cases of distillation the Patentee says, that he does not apply the naked heat of a fire to the bottom of the alembic, but immerses it in a bath of muriate of lime, contained in a suitable pan, and regulated by the thermostat mentioned before. In other cases he proposes to plant on the flat bottom of a round alembic, an upright metallic lamina, twelve inches more or less high, and of such a length that it may form a helix like the main spring

of a watch, extending with numerous coils from the centre to the circumference; or the alembic being rectangular or oblong or of any shape, the said metallic lamina or riband, may be planted upright in a zigzag direction, from one end of the alembic to the other. Whatever form this open winding channel may have, its object is the same, namely, to enable the wash already stripped in a great measure of its spirit, by the stream distillation on the rectifier vessel, figs. 12 and 13, to throw off the remainder of its alcohol, in its tortuous journey of ebullition over the bottom of the alembic.

A syphon pipe, furnished with a swivel stop cock, regulates the depth of liquor on the bottom of the still, and the level of discharge. Should any appreciable spirit be found in the discharged or spent wash, the rate of influx of fresh water into the shelf cases may be moderated.

When this continuous plan of distillation, by a perpetual ingress and egress of the wash, till the whole be worked off, is not adapted, it is recommended to the distiller to use the apparatus in the following way:—Let him introduce into the alembic, just enough of his fermented liquor to protect the copper from injury by the fire, reserving the main body of the said liquor in the charging back; as soon as the ebullition in the alembic, conducted with the usual precautions, has raised the temperature of the rectifying bath to the desired pitch, let him open the communications with the charging back, turning the index of the graduated stop cock,s o as to admit the wash in a regulated stream. Towards the end of the operation, after all the wash has run into the still, he may, for the sake of dispatch, permit the rectifying bath to take a higher temperature, and draw off the cruder and weaker spirits into a separate cistern, from which

they may be pumped into the still, as the starting or preparatory liquor of a second charge.

For the rectifying of spirits, this distilling apparatus may be worked in the same way, that is, some weaker spirits being introduced into the still, to generate steam and heat the shelf apparatus, the relatively stronger spirits in the charging back, may then be admitted through the cock and pipe *c*, in a regulated stream, while the thermostatic apparatus is so adjusted as to maintain a proper temperature in the water bath rectifier.

This plan of water bath, combined with the thermostatic apparatus, may also be used simply as a rectifying cistern, without transmitting the spirit or wash through it, since the series of shelves will cause the vapours from the still to impinge against a most extensive system of metallic surfaces, maintained at a regulated temperature, whereby their waters and crude constituents will be condensed and precipitated, while their finer alcoholic particles will proceed forwards to the refrigeratory.

A similar system of compartments furnished with shelves, especially the construction shewn in fig. 13, being immersed in the refrigeratory tub or back *h*, will afford an eligibly substitute for the serpentine usually employed. For this purpose the cases *a*, *a*, *a*, are best made of laminated tin, hardened with a little copper alloy, and they should be narrower, compared to the water cells. The spirituous vapours must of course be admitted by the upper pipe *m*, and the liquid spirit drawn off from the pipe *l*. Such a cold condensor presents the great advantage of permitting its interior passages to be readily inspected and cleansed.

The Patentee says, lastly, " I claim as my invention, the aforesaid applications of a horizontal or inclined moveable system of shelves, trays, channels, or gutters, either

straight or curved, and enclosed in metallic cases separated by water, for the purpose of exposing on an ample surface, during their descent into the alembic, fermented, or alcoholic liquids, to the action of the hot vapour arising from that alembic; and I secondly claim the combination of this moveable system of shelf cases, with my thermostatic apparatus for regulating the temperature of the water bath in which these cases are immersed; and I thirdly claim the application of the moveable system of shelf compartments, to the purpose of a condensing refrigeratory, for converting the alcoholic vapours into cool liquid; and I finally claim the application of a muriate of lime bath, regulated by the thermostat to the heating of the alembic, whereby empyreuma in the distillation of wash from all grains, &c. may be entirely prevented."

[*Inrolled in the Inrolment Office, September,* 1831.]

To William Mann, *Effra Road, Brixton, in the parish of Lambeth, and county of Surrey, gentleman, for his having discovered or found out that by the application of compressed air, power and motion can be communicated to fixed machinery, and to carriages, and other locomotive machines, and to ships, vessels, and other floating bodies.*—[Sealed 1st June, 1829.]

From a perusal of the above curious title, it would appear that the Patentee had no knowledge of the application of compressed air in the air gun, or of its adaptation in a thousand other ways, to obtain mechanical power; but even if it had not been known before, his having merely discovered, or found out, that by the application of compressed air power and motion can be

communicated to fixed machinery, and to carriages, &c. &c. is not a discovery upon which a patent can be granted; because the discovery itself is not a vendable matter; whoever therefore has dictated the title of this patent, has omitted that which should have been the very essential part of it, (viz,) that he has invented or discovered a *mode of compressing, or of applying* compressed air, &c. We take this opportunity of pointing out the fatal effects of an erroneous title, convinced that in the present instance, we are not by the exposure, subjecting a new or useful invention to the jeopardy of legal consequence, and may perhaps be communicating a hint that will be found useful to future Patentees.

The specification, which is extremely long, commences by telling us, that, atmospheric air may be compressed in close iron or other vessels, by means of manual or animal labour, by wind mills, water mills, steam engines, and other means, and that when so compressed, the vessel containing the air may be conveyed from place to place, and may be stationed in any required situation: and the air may be let off from the vessel in small currents and allowed to expand, so as to communicate by its elasticity a mechanical power capable of actuating or impelling machinery.

The common mode of compressing air, is by forcing it into a strong vessel, by means of an air pump, by which a large volume of air, at the usual density of the atmosphere, is taken and compressed into a small compass within the close vessel: the pumping operation being continued until the air within has reached that degree of density or compression required.

This the Patentee proposes to do, by means of a series of air pumps connected together; the first pump com-

pressing the air perhaps ten times, and the second ten times, bringing the condensation to a hundred times that of the natural atmosphere, and so on to any degree of density that may be desired. It is observed that this will not reduce the whole amount of mechanical labour, requisite to bring the air to the same degree of condensation, by a single pump, but yet it is to be prefered.

There is to be a reservoir connected to each pump, to receive the air as it is forced in, and a valve to prevent its returning, from which reservoir the condensed volume is taken by the second pump, and still further compressed as we have said above. No drawings accompany the specification, illustrative of the Patentee's plans, but several elaborate tables are given, shewing the required dimensions of the pistons and chambers of the series of pumps, diminishing in arithmetical progression.

When suitable strong vessels have been thus charged with condensed air, the vessels may be conveyed to the situations in which they are to be employed for actuating or driving machines, and the compressed air being then let out from the vessel in small quantities into a receiver, is there allowed to expand to a certain volume or pressure, when it may be admitted into a working cylinder, for the purpose of raising or depressing a piston by its elastic force, in the same manner as steam is applied.

In this way it is proposed, that condensed air should be employed as a power, in preference to steam, for driving locomotive engines and carriages, propelling vessels on water, and working machinery in general. Vessels containing this condensed air, may be transported from place to place, like portable gas, for actuating lathes and other small machinery, where steam engines would be inconvenient; and the air, in its condensed state, may be conducted to any part of a manufactory by means of

pipes, in the same way that Mr. Hague works his cranes at St. Katharine's Docks. (See the first Vol. of our present Series, page 95.) It is further proposed to employ this power in fortifications for discharging ordinance, by conducting the condensed air through tubes from a reservoir to any part of the ramparts.

In order to obtain condensed air in large quantities, steam engines are to be employed to work the air pumps; or windmills, water-mills, and in many cases, the tread-mills of prisons may be made available for this purpose.

When the power is to be applied to locomotive carriages running from one town to another, steam engines should be erected, at not more than ten miles apart, to supply the vessels with condensed air, as they become exhausted; and in the event of a line of locomotive carriages being established between London and Newcastle on Tyne, the surplus coal may be usefully employed in the neighbourhood of the collieries for producing steam to generate a power for condensing the air, and the vessels may be conveyed to different stations on the road, ready to be taken up for use. (See the Specification of C. C. Bombas, for propelling, &c. Vol. II. of our present Series, page 278).

We presume that enough has been said in the above report to convey a tolerable notion of the scheme proposed by the Patentee. It is not necessary for us to say another word as to the originality of the idea suggested, or of the practicability of the project; its obvious absurdity and uselessness must be perfectly evident.—[*Inrolled in the Inrolment Office, December,* 1829.]

Steam Carriages.

THE Committee of the House of Commons, appointed to examine the practicability of employing steam carriages on ordinary roads, having issued their Report, we have much pleasure in presenting our readers with an extract of such parts, as appear to possess a character of importance, and to throw light upon this interesting subject.

" The Committee proceeded in the first instance to inquire how far the Science of propelling Carriages on Common roads, by means of Steam or mechanical power, had been carried into practical operation; and whether the result of the experiments already made had been sufficiently favorable to justify their recommending to The House, that protection should be extended to this mode of conveyance, should the Tolls imposed on Steam Carriages, by local Acts of Parliament, be found prohibitory or excessive.

" In the progress of their inquiry, they have extended their examination to the following points on which the chief objections to this application of Steam have been found; viz. the insecurity of Carriages so propelled, from the chance of explosion of the boiler, and the annoyance caused to travellers, on public roads, by the peculiar noise of the machinery, and by the escape of smoke and waste steam, which were supposed to be inseparable accompaniments.

" It being also in charge to the Committee, ' to report upon the proportion of Tolls which should be imposed upon Steam carriages,' they have examined several proprietors of those already in use, as to the effect produced

on the surface of roads by the action of the propelling wheels.

"As this was too important a branch of their inquiry to rest entirely on the evidence of individuals, whose personal interest might have biassed their opinions, the Committee also examined several very scientific Engineers, by whose observations on the causes of the ordinary wear of roads they have been greatly assisted.

"The Committee were directed also to report 'on the probable utility which the Public might derive from the use of Steam Carriages.' On this point they have examined a Member of the Committee, well known for his intelligence and research on subjects connected with the interests of society, and they feel that they cannot fulfil this part of their instructions better than by merely referring The House to the Evidence of Colonel Torrens.*

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* He says " 'I conceive that agriculture is prosperous in proportion as the quantity of produce brought to market exceeds the quantity expended in bringing it there. If Steam Carriages be employed instead of Carriages drawn by horses, it will be because that mode of Conveyance is found the cheapest. Cheapening the carriage of the produce of the soil must necessarily diminish the quantity of produce expended in bringing a given quantity to market, and will therefore increase the net surplus, which net surplus constitutes the encouragement to agriculture. For example, if it requires the expenditure of two hundred quarters of corn to raise four hundred, and the expenditure of one hundred more on carriage, to bring the four hundred to market, then the net surplus will be one hundred.

" 'If, by the substitution of Steam Carriages, you can bring the same quantity to market, with an expenditure of fifty quarters, then your net surplus is increased from one hundred to one hundred and fifty quarters; and consequently, either the farmer's profit or the landlord's rent increased in a corresponging propor-

" These inquiries have led the Committee to believe that the substitution of inanimate for animal power, in

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tion. There are many tracts of land which cannot be cultivated, because the quantity of produce expended in cultivation and in carriage exceeds the quantity which that expenditure would bring to market. But if you diminish the quantity expended in bringing a given quantity to market, then you may obtain a net surplus produced from such inferior soils, and consequently allow cultivation to be extended over tracts which could not otherwise be tilled.

" 'On the same principle, lowering the expense of carriage, would enable you to apply additional quantities of labour and capital to all the soils already under cultivation. But it is not necessary to go into any illustrative examples to explain this, it being a well-known principle, that every improvement which allows us to cultivate land of a quality which could not previously be cultivated, also enables us to cultivate in a higher manner, lands already under tillage.

" 'If Steam Carriages were very suddenly brought into use, and horses thereby displaced, I think the effect stated in the question would be produced for a time; but practically, Steam Carriages can be introduced only very gradually, and the beneficial effect upon the profits of trade, by bringing agricultural produce more cheaply to market, will tend to increase profits, to encourage industry, and to enlarge the demand for labour; so that, by this gradual process, there will probably be no period during which any land can actually be thrown out of cultivation, the increasing population requiring all the food which horses would cease to consume.

" 'With respect to the demand for labour, that demand consists of the quantity of food and raw materials which can be cheaply obtained: and as, by the supposition, the displacing of horses will leave at liberty more food and more material, the demand for labour will ultimately be greatly increased instead of being diminished. It has been supposed, I know not how accurately, that there are employed on the common roads in Great Britain, one million of horses, and a horse, it is calculated,

draught on common roads, is one of the most important improvements in the means of internal communication

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consumes the food of eight men. If Steam Carriages could ultimately be brought to such perfection as entirely to supersede draught horses on the common roads, there would be food and demand for eight million of persons. But when we take further into consideration, that lowering the expense of carriage would enable us to extend cultivation over soils which cannot now be profitably tilled, and would have the further effect of enabling us to apply, with a profit, additional portions of labour and capital to the soil already under tillage, I think it not unfair to conclude, that were elementary power on the common roads completely to supersede draught horses, the population, wealth and power of Great Britiain would at least be doubled.

" 'If there are soils of such a peculiar quality that oats is the only marketable product which they will yield, the persons employed in cultivating those lands would certainly be thrown out of that particular occupation; but the extension of tillage over other lands not of this peculiar quality would create a demand for labour which would much more than absorb the persons thrown out from the culture of oats upon that land which would grow nothing else. But I doubt of there being any land which it is profitable to cultivate, which would not raise some other agricultural produce than oats either for man or cattle, for which the increasing population would create a demand.

" 'Upon the case supposed, namely, that Steam Carriages should be employed in conveying passengers only, and the whole change to be effected in a sudden manner, I think that there would in the first instance be a diminished demand for agricultural produce, but the following process would take place. As the demand for agricultural produce was diminished, the price of such produce would fall, food would become cheaper, and the cheapening of food would benefit partly the labouring class and partly the capitalists, the one obtaining higher real wages, and the other higher profits; this increase in real wages and in profits, would effect a great encouragement to manufacturing industry, and would necessarily lead to an increase in the manufacturing

ever introduced. Its practicability they consider to have been fully established; its general adoption will take

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population, and to the amount of capital employed in manufactures. The consequence would be, that after some degree of pressure upon agriculture, the increased number of human beings would create the same demand for agricultural produce which the employment of horses formerly created.

" 'So that even upon the extreme and most improbable supposition, that Steam Carriages should never be employed in conveying agricultural produce to market at a cheaper rate, still the benefit to the country would be very great, inasmuch as we should have a vastly increased industrious population, and England would become much more extensively, than she is at present, the great workshop of the world. In point of fact, superseding horses by mechanical power, would have precisely the same effect in increasing the population and wealth of England, as would be produced were we to increase the extent of the country by adding thereto a new and fertile territory, equal in extent to all the land which now breeds and feeds all the horses employed upon common roads. Such addition to the extent of fertile territory in England suddenly effected, would, in the first instance, lower the value of agricultural produce, and be injurious to the proprietors of the old portion of the territory, but no person would therefore contend that if we could enlarge the Island of Great Britain by additional tracts of fertile land, the public interests would be injured by such enlargement; this would be monstrously absurd. It is not less absurd to object to the increase of food available for human beings, by substituting mechanical power for horses.

" 'On the principles that have been already stated with respect to agriculture, the cost of bringing all things to market is comprised of the cost of production and the cost of carriage. Reducing the cost of carriage is precisely the same thing in its effects as reducing the immediate costs of production, consequently the conveyance of light goods by Steam power, must cheapen all such goods to the consumers. This will necessarily enable them to consume a greater quantity of such goods, and the consumption of the greater quantity will enlarge the demand for labour, call a

place more or less rapidly, in proportion as the attention of scientific men shall be drawn by public encouragement to further improvement.

"Tolls, to an amount which would utterly prohibit the introduction of Steam Carriages, have been imposed on some roads; on others, the Trustees have adopted modes of apportioning the charge, which would be found, if not absolutely prohibitory, at least to place such Carriages in a very unfair position as compared with ordinary coaches.

"Two causes may be assigned for the imposition of such excessive Tolls upon Steam Carriages. The first, a determination on the part of the Trustees, to obstruct, as much as possible, the use of Steam as a propelling power; the second, and probably the more frequent, has been a misapprehension of their weight and effect on

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larger manufacturing population into existence, and thereby re-act on agriculture by increasing the demand for food.

"'This cheaper mode of internal carriage will not only lower the price of light and refined manufactures to the Home consumer, but will lower their price also to the Foreign consumer. This will increase the advantages which we at present possess in the Foreign market, and tend to increase our Foreign commerce. So that here again there will be an increased demand for manufactures and for a manufacturing population, and here again will be another beneficial re-action upon the soil. So that the more we contemplate the various effects produced upon the industry of the country by a cheaper mode of conveyance, the more we must be convinced that wealth and population will be increased, and that agriculture, instead of being injured, must necessarily partake in the increased prosperity of the country. In addition to what I have already stated, the saving of expense and of time in conveying passengers and goods, and the rapidity of communication, will produce effects, the amount of which it would be almost impossible to calculate.'"

roads. Either cause appears to the Committee a sufficient justification for their recommending to the House that legislative protection should be extended to Steam Carriages with the least possible delay.

"It appears from the evidence, that the first extensive trial of Steam as an agent in draught on common roads, was that by Mr. Gurney, in 1829, who travelled from London to Bath and back, in his Steam Carriage. He states, that although a part of the machinery which brings both the propelling wheels into action, when the full power of the Engine is required, was broken at the onset, yet that on his return he performed the last eighty-four miles, from Melksham to Cranford Bridge, in ten hours, including stoppages. Mr. Gurney has given to the Committee very full details of the form and power of his Engine, which will be found in the evidence.

"When we consider that these trials have been made under the most unfavourable circumstances—at great expense—in total uncertainty—without any of those guides which experience has given to other branches of engineering; that those engaged in making them are persons looking solely to their own interest, and not theorists attempting the perfection of ingenious models; when we find them convinced, after long experience, that they are introducing such a mode of conveyance as shall tempt the public, by its superior advantages, from the use of the admirable lines of coaches which have been generally established; it surely cannot be contended, that the introduction of Steam Carriages on common roads is, as yet, an uncertain experiment, unworthy of legislative attention.

"The several witnesses have estimated the probable saving of expense to the public, from the substitution of steam power for that of horses, at from one-half to two thirds.

"Perhaps one of the principal advantages resulting from the use of steam, will be, that it may be employed as cheaply at a quick as at a slow rate; 'this is one of the advantages over horse labour which becomes more and more expensive as the speed is increased. There is every reason to expect, that in the end the rate of travelling by Steam will be much quicker than the utmost speed of travelling by horses; in short, the safety to travellers will become the limit of speed.' In horse draught the opposite result takes place; 'in all cases horses lose power of draught in a much greater proportion than they gain speed, and hence the work they do becomes more expensive as they go quicker.' On this, and other points referred to in the Report, the Committee have great pleasure in drawing the attention of the House to the valuable evidence of Mr. Davies Gilbert.*

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* Mr. Gilbert says:—" 'I have made some further remarks, which I would beg to deliver in also, tending to point out particularly the advantage of steam conveyance when the rate of travelling is great: I would beg to add, that it appears to me extremely difficult to lay down any general rule which would be applicable to all situations and all roads, inasmuch as they vary with the nature of the materials: that up to a certain weight, proportionate to the corrresponding width of the wheel, it is probable that the injury to any road may be very little, but that beyond a certain weight, compared again with a corresponding breadth of the wheels, the materials would be entirely crushed and the road totally destroyed; therefore it follows, that even on all roads there must be a limit to the weight of Carriages, as it is quite impossible that a wheel of enormous breadth could bear uniformly on all its surface. For instance, where trains of artillery are drawn over roads, the excess of their weight beyond what materials are capable of sustaining, has been found sufficient for grinding them to powder. The slow conveyance of heavy weights may perhaps be affected by steam on well-made and

"Without increase of cost, then, we shall obtain a power which will ensure a rapidity of internal communi-

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nearly level roads, so as to supersede the use of horses; but steam power is eminently useful for producing great velocities. It was last year determined by the Society of Civil Engineers, after much inquiry and discussion, that the expense of conveying Carriages drawn by horses was at its minimum when the rate of travelling equalled about three miles an hour, and that expense increased up to the practical limit of speed, nearly as the velocity: including the greater price of horses adapted to swift driving, their increased feed and attendance, the reduced length of their stages, and, with every precaution, the short period of their services; on the contrary, friction being a given quantity as well as the force requisite for impelling a given weight up a given ascent, the power required for moving steam carriages on a railway remains theoretically independent of its speed, and practically increases but a very little, in consequence of resistances from the atmosphere, slight impacts against the wheels, inertia of the reciprocating piston, &c. The expenditure of what I have termed Efficiency, is as the actual force multiplied by the velocity, and the consumption of fuel in a given time will be in the same proportion, but the time of performing a given distance being inversely as the velocity, the expenditure of fuel will theoretically be constant for a given distance, and very nearly so in practice. The power requisite for moving bodies through water is the opposite extreme; here, the mechanical resistance of the fluid increases with the square of the velocity, as do the elevation of the water at the prow and its depression at the stern. The oars or paddles must therefore preserve a constant ratio to the velocity of the vessel; and the force applied will consequently vary as the squares of the velocity; and the expendiure of efficiency being as the force multiplied by the velocity, the consumption of fuel will be as the cube of the velocity in a given time, or as the square of the velocity on a given space; and I have ascertained from the records of voyages performed by steam vessels, that the law is nearly correct in practice: hence the great power required

cation far beyond the utmost speed of horses in draught; and although the performance of these Carriages may not have hitherto attained this point, when once it has been established, that at equal speed we can use Steam more cheaply in draught than horses, we may fairly anticipate that every day's increased experience in the management of the Engines will induce greater skill, greater confidence, and greater speed.

" Nor are the advantages of Steam power confined to the greater velocity attained, or to its greater cheapness than horse draught. In the latter, danger is increased, in as large a proportion as expense, by greater speed. In Steam power, on the contrary, " there is no danger of being run away with, and that of being overturned is greatly diminished. It is difficult to controul four such horses as can draw a heavy carriage ten miles per hour, in case they are frightened, or choose to run away; and for quick travelling they must be kept in that state of courage, that they are always inclined for running away, particularly down hills and at sharp turns of the road. In Steam, however, there is little corresponding danger, being perfectly controllable, and capable of exerting its power in reverse in going down hills." Every witness examined has given the fullest and most satisfactory evidence of the perfect controul which the conductor has over the movement of the Carriage. With the slightest exertion it can be stopped or turned, under circumstances where horses would be totally unmanageable.

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for such steam vessels as are constructed not merely for speed, but also to set at defiance the opposition of winds and seas; while, on the contrary, a very small power will be found sufficient for moving ships of the largest dimensions through the water, at the rate of two or three miles an hour, when their sails are rendered useless by continued calms.'

APPENDIX

To the Report of the Select Committee of the House of Commons, on Patents.

Papers delivered in by John Farey, Esq.

[*British Law of Patents for Inventions.*]

(Continued from page 286.)

THE patents were assigned by Gamble, in 1804, to H. and S. Fourdrinier, with all interest he might have if an act of Parliament were passed, In 1807, Gamble and H. and S. Fourdrinier obtained an act of Parliament (47 Geo 3. s. 2, c. 131, of private acts), to prolong the term to fifteen years from 1807. H. and S. Fourdrinier beaome bankrupts in 1810, and then the patents passed to the assignees of bankrupts (the plaintiffs) who held the same for the benefit of more than twenty creditors who had proved debts under the commission. It was objected, that the assignees having the patents assigned to them in trust for more than five persons, contrary to the act, the privilege had become void, and the case of Hesse *v.* Stevenson was cited. Chief Justice Abbott: " The twenty creditors could not grant licenses to use the patent right, but the assignees might. I am clearly of opinion that the privileges passes to the assignees."

The new specification and drawings, enrolled in 1807 under the act, was proved sufficient; the first one of 1801, contained some French terms, and some dimensions expressed in French measures. J. Gamble, the patentee, admitted that he obtained the invention from Leger Didot, a Frenchman, and acted as his trustee in taking out the first patent in 1801, at which time we were at war with France. It was objected that the patent was void, being held in trust for an alien enemy; also it appeared that several of the improvements described in the specification, had been invented by Mr. Donkin, an engineer, who was employed by Fourdrinier and Gamble to bring the machine to perfection.

Chief Justice Abbot: " A patentee is not tied down to make a specification by words alone, but he is allowed to annex drawings; and if by comparison of the words and drawings, the one will explain the other, sufficiently to enable a skilful mechanic to make the machine, it is a sufficient specification. By the act, the

last specification is to be taken as a substitute for the former ones, and being good, supplies all their defects and omissions." His lordship left it to the jury to say whether it was a useful invention, and whether the patent had been infringed by defendant. Verdict for the plaintiffs, with liberty to move for a nonsuit.—Carrington and Payne's Reports of Cases, Nisi Prius, Feb. 1832. Vol. I. p. 558.

On the 27th January, 1825, the Court was moved for a nonsuit or a new trial, on the following grounds:

1st. That when Gamble took out the first patent, in 1801, for an alien enemy, without disclosing that fact, it was a fraud on the Crown. 2d. That the privilege, under the act, could not be assigned or held in trust for the benefit of more than five persons, or their representatives, and the assignees of bankruptcy are trustees for the whole body of creditors. 3d. That the first patent was for a machine to make paper from 1 to 12 feet wide, which the machine described in the first specification could not do; and if the first patent fails, the other and the act fails also. 4th. That four out of five of the improvements mentioned in the second specification, were invented by Mr. Donkin (the case of Barber *v.* Waldock was cited) and the fifth was no improvement at all. 5th. That the first specification contained French expressions and dimensions, and a scale to the drawing in French measures; and if any part of the specification is bad the whole is so.

Chief Justice Abbott: It was proved that the French names to the scale were quite immaterial; for relative proportion (which was all that was wanted) the scale would have been as good, if their had been no names at all: "I am of opinion that the clause in the act applied only to such assignments as are the act of the party, not to assignments by act of law." Mr. Justice Bayley: "The right of Messrs. Fourdrinier passed by a statutable assignment to the assignnees, who are their representatives." Mr. Justice Holroyd: "I think the assignees are the representatives of the bankrupts, and that they may sell the right." Mr. Justice Littledale was of the same opinion. Mr. Justice Bayley: "In the case of Hill *v.* Thompson, it is laid down that if a servant make an improvement, his master is not entitled to take a patent for it. The court decided that some of the points deserved serious consideration, and therefore granted a rule for a nonsuit or a new trial.

On the 3d February, 1827, another hearing took place in the King's Bench, on the following case:

1st. By the Act 41 Geo. 3, the privilege was to become void in case it should at any time become vested in, or in trust for more than five persons, or their representatives at any one time, otherwise than by devise or succession (reckoning executors and administrators as the single persons they represent); it was

objected that the patent had become vested in the assignees of the bankrupts, in trust, for more than five creditors. Also, 2d. The first patent in 1801, was for a machine for making paper, in single sheets, without seam or joining, from 1 to 12 feet and upwards in width, and from 1 to 45 feet and upwards in length. The second patent, 1803, was for improvements on and additions to the former. It was objected that the machine described in the specification to the first patent, was not capable of making different widths of paper; also that it was not capable of producing useful paper. The Lord Chief Justice reserved the two points, but left the latter to the jury, who thereupon found a verdict for the plaintiffs.

The first point was thus decided by the Judges. Lord Chief Justice Abbott: "In my opinion the whole clause in the Act is confined to assignments by acts of the parties, and does not apply to any transfer by operation of law. Under the Ship Register Acts, which has a similar provision: the assignees of a bankrupt take the interest in a ship." Mr. Justice Bayley: "The bankrupts did not exceed five, and the bankruptcy, by a statutable transfer, has made the assignees the representatives of the bankrupts." Mr. Justice Holroyd : "I think the assignees are to be considered as the representatives of the bankrupts, and not as the representatives of the creditors; although the assignees take the property to convert it into money, and then they hold that money in trust for the creditors." Mr. Justice Littledale: "It seems to me, that the words of the Act do not apply to a transfer by operation of law, the assignees represent the bankrupt by operation of law."

On the other point, Lord Chief Justice Abbott: "The patent was granted on the representation that a machine would make paper in sheets, of width and length varying within the limits designated : if any material part of that representation was not true, the consideration failed in part, and the grant is void: both width and length are important parts of this representation. I think the words mean, that paper of different widths could be made by the same machine, and it is a different thing, whether a manufacturer must get several different machines, or only one accomplishing the purposes of many. Unfortunately the evidence shows, that the patentee was not possessed of the invention of such a machine; I say unfortunately, because it is to be lamented that the advantage of great ingenuity, labour, anxiety and expense, should be lost to those who have bestowed them on a useful invention; he was not then possessed of any method by which different widths might be made by that machine, or any other. By subsequent improvements a machine was obtained, capable of making paper of width varying within certain limits, but not extending to half the width mentioned in

the patent. The specification enrolled by the Act 41 Geo. 3. sufficiently describes such a machine, and a mode of adjusting it to different widths, within the limits of its own breadth, but the first specification is confined to one width only ; and though the Act substitutes the new specification in place of the former ones, it cannot operate retrospectively, to enable the patentee to say that he possessed in 1801, or had then discovered a machine, which he did not possess or discover, until a much later date. If the first machine had been capable of working at different widths, though clumsily and imperfectly, the latter machine would have been an improvement of it, but the first as existing actually or in theory, being wholly incapable, the latter was not an improvement of any thing previously existing, but an addition of new matter, not existing at the date of the first patent, but which was nevertheless represented as then existing, and it was an important part of the representation and consideration, on which the grant was made. If the first grant was void, the subsequent grants by the patent, and the statute, must fall, as having nothing to support them. There must be a new trial, because the question ought to have been left to the Jury, whether the machine, as originally constructed, was capable of making paper of different widths. I did not leave it so to the jury, because the evidence showed it would not." Rule absolute for a new trial.—Barnwell and Cresswell's Reports, Vol. VI. p. 169.

Note.—This paper machinery has proved a very valuable invention; it has come into general use, and together with the modern inventions of machines for printing by steam power, has proved a great public benefit. Messrs. Fourdrinier expended all their means in bringing it to perfection, and were ruined. The creditors recovered a large proportion of their debts from the exercise of the patent right, but were put to vast expenses in the law proceedings, and, after the above opinions of the judges, chose to abandon the patent right rather than proceed to a new trial. The printing machine of Koenig, in like manner proved injurious to Mr. Bensley, who purchased the patent, and went to vast expenses in bringing it to bear. Mr. Applegath, who afterwards improved so much upon the original machine as to supersede the patent right, was also ruined by the expenses, notwithstanding that he made a great number of machines.

The King against Lister. A scire facias to repeal Lister's patent of 1823, for Improvements in the method and machinery for preparing and spinning Wool, Silk, or other animal fibres. Tried 19th Jan. 1826, in the Court of King's Bench. Verdict for the Crown.

The proceedings were at the suit of Mr. Hadden, who had a

patent in 1818 for an invention which was proved to be substantially the same as that described in Mr. Lister's specification. It was for applying heat to the fibres of wool during the operation of spinning it. Mr. Hadden did this by inserting hot iron heaters into hollow rollers between which the slivers of wool passed. Mr. Lister effected the same thing, by applying steam within the hollow rollers, and he also caused the slivers previously to pass through water so as to become wetted, in order to soften the fibres before they came between the heated rollers. It is said that Mr. Lister, at the time of this trial, had granted licences under his patent to the amount of 3000*l.* per annum.

The King against Hadden. A scire facias to repeal Hadden's patent of 1818, for an Improvement in preparing, spinning, and roving Wool. Tried 19th Jan. 1826, in the Court of King's Bench. Verdict for the Crown.

The proceedings were at the suit of Mr. Lister, who had a subsequent patent in 1823, for the same invention, and which was set aside in the previous trial as above. It was proved that the principle of Mr. Hadden's invention had been used long before his patent.

Hills and Haddock against Thompson and Hill. An Action for infringement of Hill's and Haddock's patent of 1818, for an Improvement in the manufacture of Sulphuric Acid.

The improvement is to employ iron pyrites, or other metallic sulphurets as a material for producing sulphuric acid, by burning the same in close chambers, and condensing the sulphureous vapour proceeding from the combustion, into sulphuric acid, by the aid of atmospheric air and steam. The patent was supported.

Barton against Hall. An Action for infringement of Barton's patent of 1816, for Improvements in Metallic Pistons for Steam Engines. Tried in the Common Pleas, 11th July 1827, before the Chief Justice. The Patentee was nonsuited.

The pistons, which were alleged by the plaintiff's witnesses to be infringements, were not, in the opinion of the judge, the same invention as that described in his specification, but were substantially the same as the metallic pistons commonly used long before the patent.

The King against Fussell. A scire facias to repeal Fussell's patent of 1824, for an improved method of heating Woollen Cloth, for the purpose of giving it a lustre in dressing. Tried in the King's Bench in July 1827, before the Lord Chief Justice. Verdict for the Crown.

The proceedings were at the suit of Mr. Daniell, who had a patent in 1819, for a similar process, and which he had brought into very extensive use, with great advantage. After the sur-

face of the cloth has been properly dressed, and the nap on the surface laid very smooth, the piece is rolled up very smoothly and evenly, in a close and compact roll; that roll being immersed in hot water for a sufficient length of time, the fibres of the wool become softened, and after this process they acquire a tendency to retain the same direction; and thus the effect of the dressing is rendered permanent. Mr. Fussell's process being the same, except that he submitted the roller to steam instead of hot water; it was held to be substantially the same invention, and his patent was repealed.

The King against Daniell. A scire facias to repeal Daniell's patent of 1819, for Improvements in dressing Woollen Cloth. Tried in the King's Bench in July 1827, before the Lord Chief Justice. Verdict for the Crown.

The merit and utility of the invention were fully proved, as stated in the preceding trial. One witness was brought to prove that he had practised the same method some years before the date of the patent; he swore that he operated exactly as directed in Daniell's specification, but he could not make out that he had pursued the method, or that he had attained any good result by it, nor was any corroborating evidence given. On this evidence the patent was repealed.

Crosley against Beverley. An Action for infringement of one part of Clegg's Patent of 1815, for an improved Gas Apparatus, that Patent being assigned to Crosley. Tried in the King's Bench, 20th January 1829, before Lord Tenterden. Verdict for the Patentee.

The specification describes a series of apparatus, constituting a complete apparatus for gas lighting, viz. a retort; a purifying apparatus; a gas meter, for measuring the quantity of gas supplied from a particular gas-holder, or to any particular purchaser; and a governor for regulating that supply and making it uniform. The infringement was on the gas-meter. Of this series only the gas-meter and the governor have been brought into use; all the others, after being used some time, were laid aside; it was proved that they would, and did, answer the purposes proposed, and that they were clearly described; therefore the patent was supported by the Court. The gas-meter which was the subject of the action, has been greatly improved in construction beyond what is described; but the improved meter was proved to be the same invention, although executed in a simpler and better form than those described in the specification.

The specification stated the improved apparatus to be for extracting gas from "pit-coal, tar, or any other substance from which gas capable of being employed for illuminating, can be extracted by heat." It was objected that the retort was inca-

pable of extracting gas from oil, except very imperfectly, and by the aid of considerable modifications, not provided for by the specification. Lord Tenterden: " I must look at the whole of the specification together, and I think it is evident that it only represents the retort as suited to materials of the same kind as coal. I understand, ' other substances' to signify substances then known to be available for illuminating with gas, not every thing which will burn with a flame, for in a certain sense all those produce gas. The evidence states, that oil was not then generally considered as such a substance; and the fact, that some speculations were going on at the time, with respect to its being so, will make no difference. The patentee cannot be required to foresee the success of those speculations, but I must consider him as a practieal man, to have spoken of things which practical men then treated as usable for the specified purpose. I must decide against the objection. The law is severe enough in breaking up patents altogether, for a fault in any part of them, without straining it in favour of such an objection."—Moody and Malkin's Reports, Vol. I. p. 283.

On the 27th January 1829, Motion was made for a new Trial, but it was refused.

Mr. Clegg, the inventor, having assigned all his interest, had been examined as a witness on the trial; from his evidence it appeared, that at the time he applied for his patent, he had conceived the idea of his gas-meter to be a hollow wheel, partly immersed in water, its interior being divided into chambers, which were to be alternately filled and emptied with gas, in such manner as to cause the wheel to turn round on its axis, in order to measure and record the quantity of gas which passed through those chambers: he made no drawing or model, until after he obtained the patent, and then he made a meter, which is described in the specification: but finding its structure too complicated for general use, he set about another, which is also described in the specification. From this it was objected, that an important part of the invention had been made after the date of the patent, and could not therefore have been included in the representation made to the Crown, as the consideration of the grant.

Mr. Justice Bailey. At the time he took out his patent he had discovered a new method, but between that, and the time he made out his specification, he discovered certain improvements; would not his patent be bad if he had not specified those improvements?

Mr. Justice Littledale. The general statement made in the Petition to the King, viz. " a Gas Apparatus," is equally appilcable to the present specification, and to what that specification

would have been, if it had been confined to what was passing in his mind at the time he petitioned for his patent.

Lord Tenterden. "The objection really is, whether a patent is void, when the inventor having had in his mind, at the time of applying for it, an invention capable of producing the effect he represented it to be capable of producing; but having brought that invention to a greater degree of perfection within the time allowed by his patent for making the specification, he introduces into that specification a different species of mechanical parts from those he first conceived. No case has ever decided that, and I think it would be extremely dangerons to lay down any such doctrine; I do not see why time is allowed to prepare o specification, except upon the idea that the inventor has not, at the time of obtaining his patent, brought his invention to the degree of perfection that he may be supposed to be capable of doing, and therefore he is allowed further time to do it. If in the interval the invention is perfected, so as to approach to a perfect accomplishment of the object originally in view; I do not see that it can be any objection to the patent"

Mr. Justice Bayley. "I think the specification and the patent are to be taken together as one muniment for enforcing the claims of the patentee. The specification with the new improvement, which has been found out since the date of the patent, wonld still be the invention for which the patent was obtained. I think it most beneficial to the public, and best answering the purpose of the Act of Parliament to say, that if between the period of taking out the patent, and enrolling the specification, the inventor makes discoveries which will better effect the object for which the patent was obtained, not only he is at liberty, but it is his bounden duty, to introduce the same into his specification; and that it is not sufficient for him to communicate to the public the knowledge which he had at the time he petitioned, or when he obtained his patent, but he ought also to communicate all the knowledge that he has attained before lodging the specification. I am of opinion that the objection taken to the patent in this case is not to be supported."

Mr. Justice Littledale. "I am also of the same opinion. This patent was taken out for an improved gas apparatus; at the time of applying for it, the inventor had some ideas in his mind which gave him a prospect of doing something beneficial to the public, on that the grant was made, with time allowed for making out a specification. He might be called upon to do it immediately, but time is given.

In that time something contributing materinlly to the suc-

cessful practice of the invention comes into his mind; he finds it will answer, and introduces it into his specification. Now it can only be upon a very strict technical rule, that such addition in the specification to what was passing in his mind when he applied for the patent would render that patent void. It has been held, that if a man applies for a patent for two things, and he is not the inventor of one, or there is some objection to one of them, the whole is void, because it is considered that he made an unfair representation, and obtained a patent unfairly thereupon; and if any one part fails, the whole is to fail also. That appears to me to be only a technical rule, intended to prevent frauds in obtaining patents, or for some other reason, but there is no reason why it should be carried farther than it has been. For the same reason, if any part of the specification is bad from any cause, it may render the whole void. In this case no deception was practised on the crown; the inventor professed to give a gas apparatus, and has done so; nor is any deception practised on the public, for until the enrolment of the specification, the public were unacquainted with the mode in which the invention is to be carried into effect. At first it was merely floating in his mind, but his mind having got into an improving state, is able to give an improvement of a certain value when he petitions the crown for a patent; afterwards, as he puts up the machine, to try if it will answer, and to see that the intended specification will be right, he finds from day to day how to increase the original value, perhaps to double it; surely it would be a hardship, if for thus giving the public a double mode, and adding (when he ascertains the patent) an improvemement of double the value of that which was passing in his mind when he appled for his patent, that the whole should be void, and that he should be deprived of the benefit, because he had not in his specification confined his communication to what was passing in his mind at the time his patent was sealed. I think that would be very unjust, and I know of no rule of law by which it should be.

Felton against Greaves. An action for infringement of Felton's Patent of 1827, for a machine for sharpening Knives, Scissors and Razors. Tried in the King's Bench 6 June 1829, before Lord Tenterden. Patentee nonsuited.

The description in the specification was judged incomplete because it would not enable persons to make a machine for sharpening scissors.

Scotch Patents.

List of Patents granted in Scotland from 20th December, 1830, *to 4th March* 1831.

To Thomas Walmsley, of Manchester, manufacturer, for the invention of improvements in the manufacture of cotton, linen, silk, and other fibrous substances, into a fabric or fabrics applicable to various useful purposes.—Dec. 20,

To Charles Stuart Cochrane, of Great George Street, Westminster, Esq. a Commander in the Royal Navy, for the invention, communicated to him by a foreigner residing abroad, of certain improvements in the preparing and spinning of cashmere wools.

To Robert Dalglish, jun. of Glasgow, calico-printer, for the invention of improvements in machinery or apparatus for printing calicoes and other fabrics.

To John Hall, jun. of Dartford, in the county of Kent, engineer, for the invention, communicated to him by a foreigher residing abroad, of a machine, upon a new and improved construction, for the manufacture of paper.—Dec. 28.

To William Needham, of Langour, in the county of Stafford, gentleman, for the invention of certain improvements in machinery for spinning, doubling, and twisting silk, and other fibrous substances.—Jan. 14.

To Francis Molineux, of Hampstead, in the county of Middlesex, gentleman, and William Bundy, of Kentish Town, in the same county, engineer, for the invention of certain improvments in machinery for spinning and twisting silk and wool, and for roving, spinning, and twisting cotton, flax, hemp, and other fibrous substances.—Jan. 18.

(In place of a former one) To John Ericsson, of the New Road, London, engineer, for the invention of an improved engine for communicating power for mechanical purposes.

To Samuel Clegg, of No. 16, Sidmouth Street, Gray's Inn Lane, in the county of Middlesex. civil engineer, for the invention of an improved gas-meter.—Jan. 19.

To Thomas Bulkeley, of Upper Gloucester Street, New Road, in the county of Middlesex, doctor of medicine, for the invention of a method of making or manufacturing candles.—Feb. 2.

To James Thomson, of Spencer Street, Goswell Street Road. in the county of Middlesex, gentleman, for the invention of certain improvements in making or producing printing types.—Feb. 18.

To Richard Roberts, of Manchester, in the county of Lancaster, civil engineer, for the invention of a certain improvement or certain improvements, in the mechanism employed to render self-acting machines, known by the name of mule, billy, jenny, jack frame, or stretching frame, and all machines of that class, whether the said machines be used to rove, slub, or spin cotton, or other fibrous substances.

To Augustus Graham, citizen of the United States of America, bnt now residing in West Street, Finsbury, in the city of London, gentleman, for an invention communicated to him by a foreigner residing abroad, of certain improvements in the application of springs to carriages.

To William Wedd Tuxford, of Boston, in the county of Lincoln, miller, for the invention of a machine or apparatus for cleansing or purifying wheat, grain, or other substances.

New Patents Sealed, 1832.

To George Vaughan Palmer, of the parish of St. Swithen's, Worcester, artist, for his having invented certain improvements in machinery or apparatus for excavating, and which he calls an excavating and self-loading cart.—24th January.—6 months.

To Joseph Maybury, John Maybury, and Joseph Maybury the younger, of Belton, in the county of Stafford, iron masters, for their having invented certain improvements in polishing or planishing, and manufacturing or

making of ladles, spoons, and other articles for culinary, domestic, and other purposes, made of iron and tinned. —24th January.—2 months.

To James Perry, of Red Lion Square, in the county of Middlesex, bookseller and publisher, for his having invented an improvement or improvements in or on pens. —28th January.—6 months.

To John Jellicorse, of Stansfield mill, in the county of York, for his having invented and found out certain improvements in spinning machinery.—28th January.— 2 months.

To William Lloyd Wharton, of Dryburn, in the county of Durham, Esq. for his having invented certain improvements in engines for raising or forcing water by the pressure and condension of steam.—30th January.—2 months.

To Collin Smith, of Great St. Helens, Bishopsgate, in the city of London, merchant, in consequence of a communication made to him by a certain foreigner residing abroad, for an invention of an apparatus or machine for regulating the course and action of fluids and liquors, which apparatus or machine is applicable to various purposes.—31st January.—6 months.

To Thomas John Fuller, of the Commercial Road, Limehouse, in the county of Middlesex, civil engineer, for his having found out and invented a new or improved mode or process for raising water or other fluids.—31st January.—6 months.

To William Church, of Bordsley Green, near Birmingham, in the county of Warwick, Esq. for his having invented or found out certain improvements in apparatus to be employed in the transportation of goods or passengers, parts of which said improvements are also applicable to the ordinary purposes of steam-engines.—9th February. —6 months.

To John Ericsson, of Liverpool, in the county palatine of Lancaster, civil engineer, for his having invented or found out an improved engine for communicating power for mechanical purposes.—9th February.—6 months.

To John Heathcoat, of Tiverton, in the county of Devon, lace manufacturer, for his having invented or found out a method or methods of ornamenting, embroidering, or working devices upon lace, net, and other fabrics. —16th February.—6 months.

To John Sutton Nettlefold, of Red Lion Street, Holborn, in the county of Middlesex, ironmonger, for his having invented an improvement or improvements in table furniture, applicable to other purposes.—16th February. —6 months.

To George Solomons and Elias Solomons, of Bedford Square, in the parish of Stepney, in the county of Middlesex, opticians, in consequence of a communication made to them by a certain foreigner residing abroad, for an invention of improvements in preparing certain transparent substances for spectacles and other purposes.— 16th February.—6 months.

To Richard Atkinson, of Huddersfield, in the county of York, woollen-cloth manufacturer, for his having invented or found out an improved machine or method for raising or brushing woollen-cloths and other goods.—16th February.—6 months.

To William Church, of Heywood House, Bordsley Green, near Birmingham, in the county of Warwick, gentleman, for his having invented or found out certain improvements in machinery for making nails.—25th February.—6 months.

CELESTIAL PHENOMENA, FOR FEBRUARY, 1832.

D. H. M.

1 0 0 Clock before the ☉ 12 m. 35 s

1 0 0 ☉ rises 6 h. 34 m. sets 5 h. 26 m.

1 16 0 ☾ in conj. with ♃ lon. 6 in Aquarius ☾ 2. 7 S ♃ lat. 55 S. diff. of lat. 1 12

1 23 8 ☿ passes the meridian

2 3 14 Ecliptic conj. or ● new moon

5 0 0 Clock before the ☉ 11 m. 43s.

6 0 0 ☉ rises 6 h. 24 m. sets 5 h. 36. m.

7 11 40 ♄ passes the meridian

7 21 43 ♀ passes the meridian

10 5 0 occult. of Aldebaran behind the moon, Im. 12h. 3m. mean time Em. 12. 4. 9.

8 1 0 ♀ in conj. with ♃ long. 8. 0. in Aquarius, ☿ lat. 56 S. diff. of lat. 12.

8 5 0 ☽ in conj. with γ in Taurus

9 7 13 ☽ in □ or first quarter

10 0 0 ☉ rises 6 h. 17 min. sets 5 h. 43 min.

10 0 0 Clock before the ☉ 10 m. 28 s.

11 7 49 ☽ passes the meridian

11 19 0 ♀ in conj. with ♅ long. 17. in Cap. ♀. lat. 22 S. ♅ lat. 39 S. diff. of lat. 17

12 3 0 ☽ in perige

13 23 8 ♃ passes the meridian

14 2 0 ☽ in conj. with α in Leo.

15 0 0 Clock before the ☉ 9 m. 5 s.

15 1 0 ☽ in conj. ♄ with long. 10' in Leo. ☽ lat. 2. 57. N. ♄ lat. 2. 8. N. diff. of lat. 19.

16 0 0 ☉ rises 6 h. 5 m. sets 5 h. 55 m.

16 3 22 Ecliptic oppos. or ○ full m.

17 13 12 ☽ passes the meridian.

19 20 29 ♂ passes the meridian.

19 21 57 ♀ passes the meridian.

20 0 0 Clock before the ☉ 7 m. 36 s.

20 2 11 ☾ in Aries.

21 21 13 ♅ passes the meridian.

23 20 41 ☾ in □ or last quarter

24 6 0 ☾ in Apoge

24 18 44 ☾ passes the meridian

24 0 0 0 Occult. of π Sag. Im. 16h. 28 m Em. 17h. 49 m.

25 0 0 ☉ rises 5 h. 47 m. sets 6 h. 13 m.

25 0 0 Clock before the ☉ 6 m. 4 s.

25 22 4 ☿ passes the meridian

26 22 0 ☾ in conj. with ♂ long 11 in Cap. ☾ lat. 0. ♂ lat. 1. 5. S. diff. of lat. 1. 5.

27 12 0 ☾ in conj. with ♅ long 17 in Cap. ☾ lat. 33 S. ♅ lat. l.at. 39 S. diff. of lat. 6.

28 21 57 ☾ Passes the meridian.

29 3 0 ☾ in conj. with ♀ long. 9 in Aquarius ☾ lat. 2. 16. S. ♀ lat. 57 S. diff. of lat. 1. 19.

29 4 0 ♂ in conj. with ☽ in Cap.

30 0 0 ☉ rises 5 h. 37 m. sets 6 h. 23 m.

30 0 0 Clock before the ☉ 4 m. 31 s

31 17 2 Ecliptic conj. or ● new moon

None of the eclipses of Jupiter's satellites are visible in London this month.

The waxing moon ☽.—the waning moon ☾

J. LEWTHWAITE.
Rotherhithe.

THE

London

JOURNAL OF ARTS AND SCIENCES.

No. XLIX.

[SECOND SERIES.]

Original Communications.

On the Employment of Machinery.

To the Editor of the London Journal of Arts, &c.

Sir,—It is to be regretted that the question of advantage or injury resulting from the use of machinery, still continues to divide the opinion of may classes of persons employed in manufacture. Being anxious to remove any unfavourable impressions, which, in some unthinking minds, may have arisen from the partial discussion of this subject, I venture to take an opportunity of offering you a few simple and obvious thoughts on a question of such vital importance to the interests of the whole community.

Impelled by the natural love of association, men in the early ages of the world, congregated together, and thus laid the foundation of that social edifice, which time, labour, and art, has subsequently erected, improved, and ornamented.

In the first formation of society, we must suppose men's wants were few; and from the difficulty of satisfying even the demands of necessity, they were induced to make common cause; each bringing together such subsistence as he could collect, and exchanging his little surplus with his companions, for any part of their stores, which he might desire to share, and of which they have more than they can immediately consume. Thus commences that system of barter, or exchange, which, carried on in a more extended scale, acquires the name of commerce.

The bare and actual necessaries of savage life we have supposed to be but few; and in general they are such as the bountiful hand of nature gratuitously supplies, viz. fruits, roots, herbs, and water. But for desiring man these are not long sufficient. He sees the beasts of prey feeding upon the small and timid animals around him, and naturally concludes that had he skill to catch them, they would likewise furnish him wholesome and agreeable food. To acquire such means first awakens his ingenuity; and the rude pleasures of the chace soon engage his arrested attention. Success crowns his endeavours; and he not only thus obtains food, but warm and substantial clothing. In a gradual progression towards a state of civilization, man's cunning or ingenuity furnishes him with various means to increase the productive power of his labour, and every little aid thus derived, awakens in him new desires, and suggests further improvements to his active mind.

Every accession of power, beyond that bodily strength with which nature has blessed us, is obtained alone by combinations of mechanical powers, and every means by which such accession of power is converted to useful purposes, is a machine.

We will now suppose man to be in possession, not only

of the bare necessaries of life, such as food and covering, but of even some of the ruder luxuries, which he obtains only by hard and incessant labour for six hours per day. To be more easy and explicit, we will limit the number of individuals, who have agreed to make common cause or have entered into a state of society, to one hundred: fifty males and fifty females; all which number of males are to be actively employed in providing for their own wants, and in contributing their respective shares to satisfy the wants of their companions. After the six hours labour has been performed by each, their remaining eighteen hours may be passed in rest, in idleness, or sport. One of the fifty, naturally more ingenious than the others, contrives, by the assistance of such uncouth implements as he can frame, to render his labour more productive, or to obtain the same result from his five hours labour per day, that the others obtain from their six. All eagerly copy his invention, and possess themselves of similar means; so that shortly the whole fifty are required to labour but five hours per day, to provide the same quantity of subsistence that previously occupied them six hours in procuring. One little improvement suggests another, one rude invention calls forth further ingenuity, so that in a short time the whole fifty individuals can be more plentifully and variously supplied with the necessaries of life by one hour's daily labour, than they could at first by six hours severe toil.

Here it may be objected, machinery does not secure sisimilar advantages to us; for universal practice is opposed to such simple theory. I answer, that its operation as here shown is purposely divested of all the accumulated encumbrances which burden a progressive state of society, and which obscure the effects of machinery upon industry through the long labrynth of the divisions and

subdivisions of labour; and contend, that the advantages which we derive from machinery, are equally great, and far greater in amount, than those above shown; but admit, that they are not so palpably obvious to every mind, owing to the increased complexity of the social state.

We resume our subject, supposing that the fifty male individuals, by aid of the invention of their ingenuity, are obliged to labour but one hour per day to provide themselves, and their companions, with all the necessaries of life: a reduction of five hours from the original amount of their time of labour. But this reduction will not long continue; their numbers increase; each female becomes the mother of a child; and shortly, still further additions are made to the rising community During the early and tender years of childhood, the fathers must provide their offspring with subsistence, and until the children are able to labour for themselves, their parent's toil will be thus increased (we will say) from one hour, to two hours per day. The assistance and improvements of art may have again reduced their time of labour to the fifty men, from two hours to one hour and a half per day; when one of their numbers becomes studious and wishes to devote himself to the service of religion. To assist him in his priestly duties, we will suppose that four others, who have also become drones under the effect of his example, join him in this new and sacred calling. Here is the productive power of five individuals to be swept from the account, who with their wives and children, are now to be supported, in a state of unproductive inaction, by the additional labour of the remaining forty-five. This, under the slow and gradual improvements of the ingenuity of uncultivated minds, will again increase to the forty-five, their time of labour, from one hour and a half, to three hours per day.

Whilst enjoying the pleasures of the chace, another of the remaining forty-five discovers, that in some distant part of their country, there are numbers of other indivi duals who have likewise formed themselves into a rival society, which may be likely to affect their interest. These must be immediately conquered, and dispersed. Fifteen of their ablest men are quickly chosen to set out on a murderous expedition of war, leaving their wives and children to the care of the remaining thirty. Of the chosen fifteen,' five perhaps, never return, and of the ten, who survive, one half have acquired a distaste to revert to the former drudgery of labour, and employ themselves for the future, in making weapons of defence, and in preserving order and discipline throughout their little domains. So that thirty-five are now compelled to perform the labour of the fifty, in providing subsistence and clothing for themselves, their companions, their wives, their widows, and their gradually increasing community. Notwithstanding their ingenuity, their inventions, and the improvements of art, this diminution in the number of productive labourers, will increase the total amount of their time of labour to the industrious thirty-five, from three hours, to five hours per day,

We will now suppose, as a very natural consequence, that five of the individuals, who had returned from their hostile expedition, and had resumed their former occupation as labourers, being desirous of novelty, and dissipated by a love of roving, are induced to attempt the construction of a vessel, in which they may explore the banks of the rivers, and extend their incursions along the coasts of the sea. Here are five more to be taken from the number of productive labourers, as some time must necessarily elapse before their vessel can be serviceably employed; for at first, it can only serve to gratify a restless curiosity. So that only thirty are now left to pro-

duce subsistence for themselves, the remaining fifteen males, fifty females, and the whole of their families.

To perform this without the aid of their simple machinery would be impossible. Even with the assistance of such implements as their ingenuity may have furnished them, with the gradual improvementof those implements, and with the invention of new ones, the thirty industrious, and productive labourers, would be worse off than ever, being now obliged to work not only five hours, but seven hours per day, for the maintenance of their fifteen surviving companions, who are less productively, or quite unproductively employed, and for the maintenance of their wives, widows, and children.

During this period, some of the younger members of the community would have arrived at years of sufficient maturity to render them also serviceable, by adding their little stock of labour to the general amount. This would in time lessen the burden of the industrious thirty, provided their families suffered no farther increase; but otherwise, the accession of the labour of the elder children would no more than counterbalance the increased demands occasioned by their still more rapidly increasing numbers. As they continued to increase in numbers, and as those numbers grew up into manhood, it would be necessary for the preservation of peace, good order, and proper subordination, to select some head or chief to be invested with suitable authority. Then first commences the unavoidable burdens of government. All such additions to the unproductive classes will naturally take place in every advancing society, each of which, proportionately reduces the amount and the reward of productive labour. To render this diminution less apparent and oppressive, further inventions, more efficient machinery, must be brought into action.

Contributions must now be made from the common stock to support their government in becoming honour and dignity, however simple it may be in form, and inexpensive in operation. To produce a sufficient surplus to defray the expenses of their government, would oblige the industrious individuals in the community to labour nine hours, instead of seven hours per day.

They will now no longer continue satisfied to make common cause without apportioning out the already cultivated lands, and each taking his share under his own immediate protection, by increased industry creates a surplus stock, which in time, renders him wealthy and independent of further labour. Next, laws must be framed for the preservation and security of their respective properties; and some individuals, more subtle than the rest, after framing such laws, will pretend to devote their time to maintain, defend, and explain them. Here again another unproductive class of persons spring up, and throw themselves a burden on the industry of the remainder. These will shortly render it necessary for the hard-working labourers to toil ten hours per day. As society proceeds in its more complicated form, various other classes of indolent consumers swell the numbers of the community; such as those which prepare ornaments to please the eye, provide amusements to gratify the ear, and delicacies to pamper the taste; but these individuals are more immediately lost sight of in the throng and bustle of the busy crowd; though like noxious vermin, they still continue to sap the roots of industry, and undermine every foundation of wealth, for they must all be supported out of the produce of the labour of industry.

These constant drawbacks upon the improvement of our condition, these incessant reductions of the reward of industry, shortly compel the hard working, industrious la-

bourers of the country, to toil, not only ten, but twelve and thirteen hours per day, notwithstanding the introduction, and continued improvement of machinery, and the consequent increase of the productive power of labour.

To trace out all the advantageous effects of machinery through the different ramifications and complexities of a risen society,—to ascertain the extent of assistance afforded by machinery to the productive labour of man,—to enumerate the amount of blessing which it confers upon an increased manufacturing population, would be utterly impossible; but from the brief and hasty sketch here given, which endeavours to show the operation of machinery upon a rising society, I hope it will be seen that machinery, instead of being injurious, alone enables us to bear all the long accumulated burdens of our community, by the facilities it affords to our labour and industry in carrying on the great and indispensable work of production.

Here then we see an infant society, whose numbers, limited to few, for the sake of perspicuity, are enabled, by their rude efforts of natural ingenuity, to obtain all the necessaries of life, and that, by the trifling exertion of one hour's daily labour; yet, as this society farther advances to a state of maturity, increasing in ingenuity and skill, and assisted more and more by machinery and art, its members are gradually reduced to a state of greater hardship and severer toil. How much more heavily does this toil and hardship fall on the labour of a matured society, where not only the necessaries of life, but innumerable comforts and luxuries are demanded; where competition has forced itself into every branch of production; and where the endless burdens of increased taxes are to be levied from the produce of the industrious, for the maintenance of the likewise increasing numbers of the idle and unproductive. Ought we to blame machinery as

a source of unparalleled injury, when by the increase which it effects in the productive power of labour, it alone enables us to bear so many burdens, and to maintain so many indolent classes of consumers. If any odium can be cast upon machinery, it must arise from its having furnished us with the means of supporting the numerous burdens imposed upon the labour and industry of the nation by these unprofitable idlers. To rid our country and community of the many classes which belong to the drones of our hive of industry, is impossible, many of whom furnish those luxuries which we, by habit, have now been used to call the indispensible necessaries of life; and however much the introduction and employment of machinery may have given life, and added numbers, to these unwelcome inmates, we ought, knowing our inability to eject them, to feel thankful and grateful to the system which enables us to support them without total immediate ruin to all.

Besides the impossibility of providing even the bare bare necessaries of life for a pressing population, without the aid of machinery, how let me ask is any improvement to be ever effected in our social condition, by the addition of conveniences, comforts, and luxuries, unless facilities be afforded by ingenuity and skill, to render labour more productive, and to increase the amount of consumable articles beyond what unassisted nature could effect. Little do they "who clamour against machinery" consider that every comfort and luxury they enjoy, is secured to them (only) by the gratuitous assistance of what they deprecate as ruinous to the best interests of the community. In short were we blind enough to allow their views of the abolition of machinery to be carried into effect, from being wealthy, powerful, and civilized as a nation, we should irremediably fall at once into a state

of the most abject poverty, and weakness, and soon relapse into barbarism. As well might the bees of a well stored hive tear off the wings which had borne them from flower to flower, collecting honey, merely because some worthless drones idly and unprofitably consumed the produce of their toil, and thus increased their total amount of labour necessary to replenish the empty cells.

Trobridge, Wilts, Feb. 1832.

Yours, I. A.

Recent Patents.

To MILES BERRY, *of the Office for Patents, Chancery Lane, in the parish of St. Andrew Holborn, in the county of Middlesex, engineer and mechanical draftsman, in consequence of a communication made to him by Monsieur Jean Nicholas Senechal, ingenieur, des ponts et chausses, residing at Versailles, in the kingdom of France, for an invention or discovery of certain improvements in the boilers or generators of steam and other vapour; and in engines to be worked by steam or vapour, for propelling or actuating machinery on land, and boats, vessels or other floating bodies on water; and also in the mode of condensing such steam or vapour.*—[Sealed 28th September, 1831.]

THE subjects of this Patent, among other ingenious suggestions, present two striking novelties viz. a self regulating mode of abstracting heat from a boiler, in the event of the steam rising in temperature or pressure beyond that at which it is intended to be worked; and also a mode of effecting the condensation of the eduction steam, without employing an air pump; by leading

it through tubes into boxes connected with the paddle wheels of a boat, or the fly wheel of a land engine, which in revolving through water and air, sufficiently refrigerates the vapour to produce a vacuum in the working cylinder. The inventor of these improvements is Monsieur Galy Cazalat, formerly of the School of Arts, now Professor of Mathematical and Physical Science, at the Royal College of Versailles in France. The following is the substance of the specification:—

These improvements in the boilers or generators of steam and other vapours, and in the engines to be worked by steam or vapour, consist in the following general features:—First, in connecting certain parts of a boiler to a bath containing a dense fluid, by which a portion of heat may be absorbed, from the steam if accidentally raised above a given pressure, and thereby the possibility of explosion prevented, without the necessity of a single valve in connection with the boiler; and which absorption expands the dense fluid, and by that means causes a mechanical action to take place, which removes the fire-grate or furnace, and hence suppresses the quantity of heat applied to the boiler. Secondly, in the peculiar arrangement and construction of certain parts of the engine, viz. the crank shafts which are made hollow, for the purpose of carrying away the eduction vapour to the condensers: by which the air pumps may be partially if not entirely dispensed with; and the adaptation of tubes which convey the condensed vapour away from the axle into the receiver below. Thirdly, in the construction of a moveable condenser, in connection with, or forming part of the paddle wheel of a marine—or fly wheel of a land engine: by the rapid motion of which through the water and air, the cooling and condensation of the vapour is effected.

In plate I. fig. 1, is a longitudinal section of the tubes and chambers constituting the boiler or generator, and its flues; fig. 2, is a transverse section of the same; A, B, C, are cylindrical tubes placed longitudinally, and intended to contain water, or other liquid from which steam or elastic vapour is to be generated. These longitudinal tubes are connected together by vertical tubes, in any convenient way, and communicate through the necks, *a* and *b*, with a larger cylindrical tube D, placed longitudinally above. The system of tubes A, B, C, which may be otherwise arranged and connected, is enclosed within a tight casing of iron, or other fit material, formed as a box E, E, E. This box is divided into passages for flues by flanges or partitions extending from the sides of the tubes, and attached to the case; and through these flues the flames, vapour, and smoke from the furnace F, passes in the directions shewn by the arrows; and, after heating the tubes, the smoke or vapour ultimately escapes at the chimney G. The whole of these tubes, with their furnace and flues, are encompassed by an outer vessel of iron, or other suitable material, H, H, H, H, open at top, which forms another boiler, intended to be filled with water, containing the dense fluid, a solution of potash in water. The top of this liquor is to be covered with a layer of tallow or oil, in order to prevent the liquor evaporating before it becomes heated to the boiling point, which would not take place until its temperature is raised to 284 of Fahrenheit's thermometer. On the top of this liquor a flat board or cover I, I, floats, and ascends or descends as the fluid becomes expanded or contracted by variations in its temperature. The tubes A, B, C, are to be filled with pure water, which has been exhausted of its air; and this water must also rise or flow through the necks *a*, and *b*, into the upper tube D, until it has occu-

pied about one-sixth of that tube's capacity. A force or injecting pump may be employed to effect this object.

The atmospheric air, to support combustion in the furnace F, is admitted through a door K, by means of which the flames and heated vapours are made to pass through the flues, and round the water tubes as before described. The steam generated by these means rises from the several tubes into the upper one D, and proceeds from thence through the small tube L, to the working cylinder of an engine placed near it. If it should happen that the temperature of the steam in the generator at any time rises too high, the solution of potash in the outer vessel which surrounds the tube D, will absorb a portion of the heat, and it will continue so to do until the solution begins to boil, which will take place at a temperature of 284° Fahrenheit. The water in the outer vessel will then, by evaporating, carry off the surplus heat, and leave the solution still at a temperature of 284° Fah.; the consequence of which is, that if the boiler D, be made capable of resisting the force of the working steam (say 320° of Fahrenheit), the bursting of the boiler will be physically impossible.

It is, nevertheless, advisable at all times to prevent the saturated water (which is termed preservative liquor) from boiling. To this intent the fire grate F, is mounted upon small wheels or pulleys, which roll upon a rail way frame, formed by two parallel rods M, bearing as levers upon a knife-edged fulcrum N, behind the furnace; and at the front supported by a perpendicular chain O, attached to the end of a long lever P, placed above the boiler. The fire grate, by these means, stands upon an inclined plane, the lowest part of which is in front, as shewn at fig. 1. But in the event of the saturated fluid becoming heated beyond the temperature of 266° Fah. (at which point it begins to dilate considerably) it will,

by its expansive force, raise the floating board or cover I, I. This board is connected by a rod or arm Q, to the lever, P; and, consequently, in rising moves the lever P, upon its fulcrum joint in the standard R; this movement of the lever lifts the chain O, and raises the front part of the inclined plane M, so as to cause the fire grate to run back by its own gravity into the closed space under the boiler as far as the stop S. The flame of the furnace will, in this situation, quickly die away, and the combustion consequently decrease. As the working steam becomes consumed, the temperature which had been raised will now diminish, the preservative liquor will contract again, and the float I, and lever P, will descend, and lower the rods, so as to bring the fire grate back to its former position.

The boiler for a large engine is composed of several sets of tubes, arranged as above, and placed one by side the other; and the small chimneys all lead into one large chimney. The several sets of boiler tubes cummunicate with each other by a lateral tube, at T, or in any other convenient situation; and into this lateral tube the pump forces the water or liquid from which the steam or vapour is to be generated. The several steam tubes D, are likewise connected together, and lead to one common steam chamber; and lastly, a similar pipe is intended to form a communication between the several vessels or troughs of preventive liquor, which are at first filled by a pump adapted in any convenient way; and by the same means they may be replenished, occasionally, with water, when it is found to have diminished its volume by evaporation through the superincumbent layer of tallow or oil.

By the above described arrangement of apparatus, it has been found perfectly practicable and safe to employ spirits of different kinds, either alone or mixed with water,

for the purpose of generating an elastic vapour, capable of working an engine in the same way that steam would be employed. Either, for instance, may be used in lieu of water; by lowering the level of the water in the tube D, to about one tenth of its capacity, and then injecting, by means of the pump, about another tenth of either. The preservative liquor, in this case, may be pure water, or water saturated with any kind of salt, will do equally as well as potash; but a superincumbent surface of oil or tallow must, in all cases, cover the preservative liquor, to prevent evaporation.

The novel arrangement of the engine is represented, with all its parts at fig. 3, one of the working cylinders, with its appendages, being shewn in section, and the other in its external appearance. These working cylinders A, A, are both fixed upon a strong metallic chest B, B, which is designed to be a reservoir, from which the pumps feed. A double beam *c, c*, mounted upon an axle at D, vibrates, one on each side, the engines being between, as shewn in the plan view, fig. 4. The two piston rods are connected to the beams, near the ends, by lateral rods E, E, and, of consequence, the piston in one cylinder ascends, while that in the other cylinder descends. At the extremities of the beams, the crank rods G, G, are attached by swivel joints, and the crank shafts are made hollow, for the purpose of effecting a condensation of the eduction steam, in a way that will be hereafter explained.

The crank shafts turn in bearings at H, H, H, or in any other convenient situations, and their extremities are connected to the stationary sockets I, I, by union joints at K, K; the piston rods are guided by pulleys L, L, running up and down between the standards M, M, fixed on the tops of the working cylinders, and to the frames or carriages of these pulleys, the upper ends of the lateral rods E, E, are attached. The feeding pumps N, N, are worked by

rods connected to the beams at x, x, and the slide valves are worked by excentrics O, O, upon the crank shaft.

The steam or vapour generated in the boiler, either in the way above described or by ordinary means, being conveyed by a pipe, enters the steam box at P, and being inducted through the aperture *a*, into the working cylinder, depresses the piston ; at the same time the eduction steam from the opposite side of the piston passes from the aperture *b*, into the recess of the slide valve Q, and from thence through a passage *c*, on the side of the cylinder, by a pipe to the stationary sockets of the hollow crank axle I, I, before described, through which the condensation is affected.

As it may be advantageous to allow the steam or vapour to work by expansion, the sliding valve in that case must be constructed accordingly, and may be made upon any of the plans in common use.

To prevent, as much as possible, the eduction steam or vapour from becoming chilled while working, the cylinder is enclosed within a jacket or case R, R, filled with a dense fluid, consisting of a solution of potash or other salt. This fluid may be heated by means of a connection with the boiler ;—supposing a part of one of the sets of tubes described above (of which several sets constitute the complete boiler) to be disconnected from the other sets of tubes, for the purpose of supplying this dense fluid in a heated state to the jacket or the engine.

In this individual boiler, or rather portion of the general boiler, the communication of the upper tube D, and the middle tube B, with the other tubes A, and C, is cut off; these last mentioned tubes are then filled with the dense fluid which flows from thence into the jacket, filling it also nearly to the top, and surrounding the working cylinder, on the surface of which there must be a coating or layer of oil or tallow, to prevent the evaporation of the water, before the temperature of the dense fluid is raised

to the boiling point. This oil or tallow floating at the top, will at the same time grease the rods of the piston and of the sliding valve.

The rubbing surface of the piston is formed of tempered steel, bent into the form of hoops, the ends of which are united by a piece of leather, which completes or closes the circles, thus allowing them to expand or contract. These metallic hoops or circles are attached at the upper and lower edges, to the circumferences of two leather disks, nailed upon a wooden disk of convenient thickness, which occupies the solid central part of the piston; and these are pressed together by two outer plates or discs of iron. The piston, thus surrounded by the metallic hoops, must fill the interior of the cylinder as tightly as possible, without producing too great friction.

The piston is formed with a hollow rod, into which melted tallow is poured; this tallow is intended to pass by a small internal channel, and to ooze through between the wooden disk and the circle surrounding it, for the purpose of greasing the piston in the working cylinder; and in order to give sufficient force to expand the metallic ring, the tallow is pressed by a small plug or piston inserted in the top of the hollow piston rod at *e*, and adjustable by a screw which forces it down; and the tallow being thus pressed, expands the metallic hoop tightly against the interior surfaces of the cylinder.

The moving condenser is formed in connexion with the paddle-wheel of a marine engine, or the fly wheel of a land engine. The steam, after escaping from the eduction, passes as before said, into the hollow crank shaft of the engine, and from thence through hollow rods, or arms, extending from the said hollow shaft to boxes at the back of the several paddles of the propelling wheel, or into chambers in the circumference of the fly wheel, which,

by passing round, become cooled by successively dipping intu the the water, in which the vessel floats, or intc a pool or reservoir, placed conveniently for the purpose.

One paddle is shewn at fig. 3, in the situation in which it would stand when immersed in the water. The parts of the wheel, and the arms by which the paddles may be fixed, are here omitted, as not necessary to the illustration. Fig. 5, is a section, or edge view, of the paddles, the face of which, or surface that strikes the water, is flat, as usual; but behind there is a box, or hollow space w, formed by the back of the paddle, and a corrugated, or fluted, sheet of metal attached thereto. This corrugated sheet of metal is designed to expose an extended surface to the refrigerating medium, both of cold water and air. The pipe from the hollow crank shaft leads down into this box or chamber, and conveys the eduction steam into the chamber, to be condensed. Every one of the paddles is intended to be so furnished with a condensing box, and, in the fly wheel of a land engine, similar chambers may be made in or near its periphery, to which the eduction steam is to lead through the arms.

The liquor produced by this mode of condensing the eduction vapour, will, when the arm of the wheel rises, flow into the hollow axle, and assist the condensation of the steam through which it passes. The vapour, when thus liquified, will flow along the crank axle into the reservoir below, by the perpendicular tubes, and from thence the feeding pumps are intended to inject it again into the boilers. There are two syphons z, connected to these perpendicular tubes, the bulbs of which are partly filled with mercury; they are intended as guages, to shew the state of condensation, and as escapes to the air in blowing the engine.

By this arrangement of the parts, the engine if employed for propelling ships, boats, &c. may be placed trans-

versely in the vessels, which allows of considerable simplicity in its construction, and, by the use of the condensing boxes, in the way described, the dimensions of the air pumps may be diminshed, if not altogether dispensed with; and, in using pure distilled water, exhausted of air, to feed the boilers, in the way above explained; their surfaces will never become foul, or require cleaning.—*Inrolled in the Rolls Chapel Office, March,* 1832.

Specification drawn by Messrs. Newton and Berry.

To EDWARD DAKEYNE, *and* JAMES DAKEYNE, *both of Darley Dale, in the county of Derby, merchants, for their having invented a machine or hydraulic engine for applying the power or pressure of water, steam, and other elastic fluids, to the purpose of working machinery, and other uses requiring power; and applicable to that of raising or forcing fluid.*—[Sealed 21st January, 1830.]

THIS is a sort of rotatory engine, the centre upon which it moves being a ball and socket joint, and the piston a flange or broad ring, extending from the equatorial part of the ball, but called by the Patentees an *ecliptic* ring; which is designed to move with a rolling motion within a circular box. The water, steam, or other fluid intended to actuate this engine, is admitted into the circular box on one side, through an aperture, against a perpendicular partition which bisects the ring in a notch, allowing it to vibrate; and the water or steam acting within the box upon the surface of the oblique ring, or piston, causes it to be depressed on one of the circular boxes, and elevated on the other side, thereby moving the ball to which the

ring is affixed upon its central point, and giving a vibratory motion to its pole.

The construction and operation of this engine is by no means clearly made out in the specification. Its description is of very considerable length, and encumbered by a multitude of far-fetched expressions and scientific terms, which in their appropriation are more impressive in sound than expressive in sense. We shall, however, render the subject as clear as we can, under the circumstances, assisting our explanation by figures of the most important parts of the machinery.

Plate II. fig. 1, is an elevation of thecomplete machine supposed to be in working order. Fig 2, is a section taken vertically through the centre of the machine, shewing its principal working parts; of which the Patentees commence their description in the following words:—

"The fluid used for the purpose of working the machinery, revolves through a circular groove or channel A, A, formed round the equatorial circumference of a globe B, having ingress and egress through two narrow openings *a*, *b*, close on each side of a stop or partition *c*, placed across the said channel (see the horizontal view fig. 3;) and the circumition of the fluid gives conical motion to the poles of the said globe B, on the centre C, effected by pressure on the planes of a circular plate or flange D, united to the equatorial circumference of the said globe B, which we denominate the ecliptic ring."

"The said globe B, beingplaced in an oblique position, the said ecliptic ring thereon forms semicircular inclined planes longitudinally across the said channel, the fluid pressing on which, causes the said poles to revolve conically in orbs or circles on the vertex of the centre C; and by the said conical motion of the poles of the said globe B, revolving motion is communicated to machinery by

means of the taper rod E, which is fixed in the upper pole of the said globe, as in fig. 1. The opposite pole of the said globe may also act conjointly therewith, as shewn in the arrangement at fig. 4, hereafter described."

The circular box G, which encloses the ball and its ring, is made in two parts, and united in the middle by two horizontal flanges bolted together; the vertical sectional figure of which is seen at fig. 2, its periphery being turned smooth, and in the form of the equatorial part of a concave sphere, against which the periphery of the ecliptic ring acts being tightly packed on the edges, as pistons usually are.

The specifications go on to describe, in a very learned strain, "a system which appertains to the fulcrum of the machine" (the ball and socket joint in the centre, we presume;) connected with which there are "certain spaces or superficial areas of defined dimensions *g, h*; and *g, i*, encompassed on the polar surfaces of the said globe B; the said surfaces being partially enclosed by spherically concave cups or shells, constructed on each division of the said case G, and their junctures to the said surfaces being secured by water-tight packages near the poles at *h*, and *i*, the said spaces are circumscribed thereby immediately betwixt, the before-described packages *g*, on the said surfaces beneath the said cups or shells."

"The said stop or partition *c*, which cuts off the communication, or excludes the junction of the ingress and egress fluid, and causes the circumition round the said channel A, A, consists of a thin plate constructed of wrought iron or brass, or other strong or suitable material, and is fixed stationary in the said channel, in the radius, to the centre of the said globe B, and right angularly across the said channel A, and made firm and stationary in grooves to the three

internal angular planes *e*, and *f*, *f*, and is curved to form a juncture to the moveable globe B, and made as nearly as possible water or steam-tight thereto, by a package of leather or other proper material laid into a groove, or otherwise, by any of the known methods."

"The said two narrow openings *a*, and *b*, for the ingress and egress of the fluid, are constructed close on each side of the said stop or partition, and perforate; the periphery of the said channel A, A, and also the said opposite planes *f*, *f*, thereof, laterally, on each side of the said stop or partition."

The specification proceeds to explain the ecliptic ring, which we have described above, and then its action, as follows:—"And the said planes of the said ecliptic ring, being constructed in the radius to the centre of the globe B, and turned true and smooth, form water or steam-tight joints, with the similar constructed internal opposite planes *f*, *f*, of the said channel A, A; and by the inclination of the poles of the said globe B, the ecliptic ring forms a diagonal circular division longitudinally athwart the said channel, each of its sides being in contact with the internal opposite planes of the said channel, through the centre, and circumvolves or rolls in the circle round the said channel, with conical motions of the poles of the said globe B. The respective definite radii of each plane or surface of the ecliptic ring, meeting those of the internal opposite planes of the said channel A, A, forming opposite each other, through the centre two water or steam-tight radial joints, revolving the said channel A, A; which action we denominate the ecliptic circumvolution. And in spontaneous succession one or the other side of the half circular plane or surface of the ecliptic ring, athwart the said channel A, A, the circumition of the propelling fluid round the said channel having ingress at one of the said

narrow openings, close to one side of the said stop or partition, and egress at the other close to the contrary side thereof, impels the described motion by pressure, effecting conic revolutions on the poles of the said groove B, with regular impetus impressed from the impelling cause continued.''

It is by this, and what follows in the specification, to be understood that the ecliptic plane moves round in the box, and that the pole of the globe is made to move in a course resembling an inverted cone, to give motion to a wheel or other machinery connected to its extremity. It appears to be unnecessary to pursue the elaborate description of this machine, as the intention of the Patentee must be perceived.

There is certainly considerable ingenuity, and, we believe, novelty, in this contrivance; but we are by no means satisfied that it would act in the way described, or, at least, with any advantage over other constructions of steam engines for driving machines.

In the modification of the machine, shewn in section at fig. 4, an axis is carried through the globe, and it is then proposed to adapt the mechanical power exerted by both poles, to the driving of the machine. It is further suggested that the same contrivance may be employed as a force pump, in which case power must be applied to the pole to drive it.—[*Inrolled in the Petty Bay Office, July*, 1830.

To Margaret Knowles, *of Lavender-Hill, Battersea, in the county of Surrey, Spinster, for her invention of an improvement in axletrees, for, and mode of applying the same to carriages.*—[Sealed 4th July, 1829.]

The object of the Patentee appears to be that of enabling a carriage to turn within a smaller space than the ordinary constructions of the fore axle of a travelling-carriage or waggon will allow, which moves round or locks, as it is termed, upon a centre pin, fixed in or near the perch in the middle of the fore part of the carriage. The improvoment consists in attaching a distinct best axle on each side of the carriage, which is mounted in a suitable frame, and turns horizontally upon a vertical pin.

Plate II. fig. 5. represents an elevation of the axletree proposed; *a, a* are the ends of the axles, on which the running wheels of the vehicle are to be mounted; *b, b* are elongations of the axles, extending inwards; *c* is a vertical pin, passing through *b*, which is fastened to the top and bottom brackets *d, d*, and *e, e* are braces to keep the axles and pins firmly together; the two brackets *d, d*, being held fast by a block *f*, bolted to them in the middle between the two axles.

Fig. 6. is a variation of the contrivance, shewn in a horizontal view; *a, a* are the ends of the axles to receive the wheels as before; *b, b* their elongated parts; *f, f*, is the axeltree attached to the pole or perch *g*. The axles *a, b*, and the axeltree *f*, are connected together by brackets *e, e*, turning upon pins *c, c*, the ends of the brackets being attached to the pieces *b*, by joints at *i, i*. This contrivance is stated to be for the purpose of giving

play when the body of the carriage is mounted upon springs.

Fig 7, is another horizontal representation, we suppose, of the same construction; the pole or perch of the carriage being inclined on the side, as in turning, and the short axles turned also.

It must be confessed that this description is insufficient in many points, to render the invention evident, or capable of being brought into operation. We have, however, given as complete an account of it as the specification will permit, and must therefore leave our readers to reconcile the obvious impracticability of the scheme in the best way he can.—[*Inrolled in the Inrolment Office, January,* 1830..

To THOMAS SALMON, *of Stoke-Ferry, in the county of Norfolk, maltster, for his having invented an improved malt-kiln.*—]Sealed 9th July, 1829.]

WHEN malt or other grain is exposed upon a flat surface, to be dried by the application of heat beneath it, the steam evaporated, passing through the bed of grain, becomes cooled, and instead of flying off, condenses, and settles upon the upper surface, to the injury of the grain and the protraction of the drying process. The Patentee, therefore, proposes to apply heat, both to the under and upper surfaces of the grain, when spread out to dry, by the following means:—

Plate II. fig. 8, is supposed to represent in perspective, a small part of the drying floor of a kiln, formed by square tiles, placed side by side, with small perforations

event of the larger divisions of the beam representing ounces, the sliding scale may give pennyweights or grains.

There is a standard *g*, with a square spring at top, in which the end of the steelyard is confined; this is merely designed as a rest, and to prevent the beam from moving through too large an angle.—[*Inrolled in the Inrolment Office, February*, 1829.]

To FRANCIS HORATIO NELSON DRAKE, *of Clayton House, in the county of Devon, Esq. in consequence of a communication made to him by a foreigner residing abroad, for certain improvements in tiles for covering houses, and other buildings.*—[Sealed July 25, 1829.]

THE object of this improvement is to form roofs with tiles of clay, properly baked, which shall be so connected together that the surface of the whole roof may be perfectly smooth—that is, without any visible overlaps, and yet conduct the water away safely, however little elevated the roof may be.

Plate II. fig. 10, exhibits one of these improved tiles as it would appear detached, and seen on the upper side. The part *a*, is lower—that is, only about half the thickness of the part *b*, there being a ledge formed at *c*, *c*, for the bottoms of the two next adjoining tiles to fit up to. Diagonal grooves are cut at *d*, *d*, which lead into lateral channels *e*, *e*, for the purpose of conducting the rain-water that may insinuate itself through the joints of the upper tiles. This water will, of consequence, pass along the ledge *c*, and by that means will be carried off by a

wedge-formed channel *f*, in the middle of the part *b*, to the next tile below, and so on till it reaches the eaves or gutter of the roof, and thus having a ready means of escape, does not lodge on the tiles. These are to be moulded in clay, and baked in the ordinary way, and may be coloured and glazed to resemble slates.

Fig. 11, shews the face and edge views of an improved pantile, the form of which enables the tiles to lock iuto each other, when laid upon the roof.

These tiles are said to possess the following advantages.—They present a plain surface (referring to the flat tile first described,) and are not acted upon by the wind, are perfectly immoveable, except when singly raised in the order in which they were placed, as every tile is confined by those which lie above it; and as respects the pantiles, every one is held down by three above it, so that they lock each other, and no cement or mortar is necessary to confine them. When broken, by accident, any one can be replaced with the greatest facility.

A roof constructed of these tiles is impervious to the heaviest rain or snow, and is far more durable than any other kind of covering; when coloured they resemble slates, and are much lighter on a roof than the best kind of slates; as 360 of them weigh only one hundred weight, and will more than cover a hundred square feet. They may also be used, with great advantage, as a coating for walls.—[*Inrolled in the Inrolment Office, January,* 1830.

Steam Carriages.

Report of the Committee of the House of Commons.

(*Continued from* Vol. VIII.)

"The Committee have throughout their examinations been most anxious to ascertain whether the apprehension, very commonly entertained, that an extensive use of these Carriages on roads would be the cause of frequent accidents and continued annoyance to the public, were well founded.

"The danger arising from the use of Steam Carriages, was stated to be twofold—that to which passengers are exposed from explosion of the boiler, and the breaking of the machinery; and the effect produced on horses, by the noise and appearance of the Engine.

"Steam has been applied as a powerful draught in two ways; in the one, both passengers and Engine are placed on the same carriage; in the other, the engine carriage is merely used to draw the carriage in which the load is conveyed. In either case, the probability of danger from explosion has been rendered infinitely small, from the judicious construction of boiler which has been adopted.

"These boilers expose a very considerable surface to the fire, and steam is generated with the greatest rapidity. From their peculiar form, the requisite supply of steam depends on its continued and rapid formation; no large and dangerous quantity can at any time be collected. Should the safety valve be stopped, and the supply of Steam be kept up in greater abundance than the engines require, explosion may take place, but the danger would

be comparatively trifling, from the small quantity of steam which could act on any one portion of the boilers.

"The danger arising to passengers from the breaking of the machinery need scarcely be taken into consideration. It is a mere question of delay, and can scarcely exceed in frequency the casualties which may occur with horses.

"It has been frequently urged against these carriages, that, wherever they shall be introduced, they must effectually prevent all other travelling on the road; as no horse will bear quietly the noise and smoke of the engine.

"The Committee believe that these statements are unfounded. Whatever noise may be complained of, arises from the present defective construction of the machinery, and will be corrected as the makers of such carriages gain greater experience. Admitting even that the present engines do work with some noise, the effect on horses has been greatly exaggerated. All the witnesses accustomed to travel in these carriages, even on the crowded roads adjacent to the metropolis, have stated, that horses are very seldom frightened in passing.

"The Committee, having satisfied themselves that steam has been successfully adopted as a substitute for Horse Power on roads, proceeded to examine whether tolls have been imposed on carriages, thus propelled, so excessive as to require legislative interference, and also to consider the rate of tolls by which steam carriages should be brought to contribute, in fair proportion with other carriages, to the maintenance of the roads on which they may be used.

"They have annexed a list of those local acts, in which tolls have been placed on steam, or mechanically propelled carriages.

"Mr. Gurney has given the following specimens of the oppressive rates of tolls adopted in several of those acts: On the Liverpool and Prescot road, Mr. Gurney's carriage would be charged 2*l.* 8*s.*, while a loaded stage coach would pay only 4*s.* On the Bathgate road the same carriage would be charged 1*l.* 7*s.* 1*d.*, while a coach drawn by four horses would pay 5*s.* On the Ashburnham and Totness road Mr. Gurney would have to pay 2*l.*, while a coach drawn by four horses would be charged only 3*s.* On the Teignmouth and Dawlish roads the proportion is 12*s.* to 2*s.*

"Such exorbitant tolls on steam carriages can only be justified on the following grounds.

"First, because the number of passengers conveyed on, or by, a steam carriage, will be so great as to diminish (at least to the extent of the difference of the rate of toll) the total number of carriages used on the road; or, secondly, because steam carriages induce an additional expense in the repairs of the road.

"The Committee see no reason to suppose that, for the present, the substitution of Steam Carriages, conveying a greater number of persons than common coaches, will take place to any very material extent; and as to the second cause of increased charge, the trustees, in framing their tolls, have probably not minutely calculated the amount of injury to roads likely to arise from them.

"The Committee are of opinion that the only ground on which a fair claim to toll can be made, on any public road, is to raise a fund, which, with the strictest economy, shall be just sufficient, first to repay the expense of its original formation; secondly, to maintain it in good and sufficient repair.

"The Commitiee would direct the attention of The

House especially to the Evidence of Mr. Macneil,* whose observations on this branch of the subject, being founded on a long course of very accurate experiments, are peculiarly interesting and useful. He estimates that the feet of horses drawing a fast coach, are more injurious to the road than the wheels, in the proportion of three to one nearly; that this proportion will increase with the velocity; that by increasing the breadth of the tires of the wheels, the injury done to roads by great weights may be counteracted. He considers that on a good road, one ton may be safely carried on each inch of width of tire of the wheels.

"Mr. M'Adam and Mr. Telford have given corresponding Evidence as to the greater wear caused by horses' feet than by wheels of Carriages.

"Each of the above Witnesses agrees, that, adding the weight of the horses to that of the coach, and comparing the injury done to a road by a steam carriage of a weight equal to that of the coach and horses (the wheels being of a proper width of tire), the deterioration of the road will be much less by the steam carriage than by the coach and horses.

"Apprehension has also been entertained, that although the peculiar action of the wheels may not be injurious, yet that, from the great power which may be applied, if the steam were worked at a very high pressure, or if the size of the engine were increased, greater weight might be carried than the strenghth of the road could bear.

Mr. Macneil's evidence before the Committee shews him to be a man of science, cool judgment, and a scholar; the minutes of his evidence will be read with great satisfaction by mathematicians generally, but more particularly by those interested in the subject of wheel carriages.

"Undoubtedly, in proportion to the advance of the science, will be the increase of weight drawn by an Engine with a given expenditure of fuel; but there are many practical difficulties to be surmounted before the weight so drawn can reach the point when it would be destructive of roads. There are no theoretical reasons against the extension of the size of the engines. The difficulties, according to Mr. Gurney, are of a practical nature, and only in the "difficulty of management of a large engine." In proportion as we augment the power of the engines, we must increase their strength, and consequently their weight; the greater weight will be a material diminution of their efficiency. To a certain extent the power may be increased in a greater ratio than the weight; but, with our limited knowledge of the application of Steam, and with the present formation of the Public Roads, the point will be very soon attained, when the advantage of increased power will be counter-balanced by the difficulties attendant on the increased weight of the engines.

"The weight drawn, at the rate of ten miles per hour, by Mr. Gurney's engine, has not, on any extent of road, exceeded the weight of the drawing Carriage; nor is it likely, with the difficulties to be encountered on the present lines of road, from their quality and the numerous ascents, that the weight drawn will be in excess of the strength of the roads. The immense quantity of spare power required to surmount the different degrees of resistance likely to occur, would render the engine too unmanageable. This will appear evident from the force of traction required to draw a waggon over the Holyhead and Shrewsbury road, which varied from 40 to upwnrds of 300 lbs.

"In considering the effect on roads, we must not over-

look one peculiarity, in which they have a great advantage over other carriages. In coaches drawn by horses, the power being without the machine to be moved, it becomes an object of the greatest importance to give as much effect as possible to the power, by diminishing the resistance, arising from the friction of the wheels upon the surface of the road. For this purpose, the proprietors of coaches and waggons have adopted every possible contrivance, so to reduce the tiers of their wheels, that a very small portion of them may press on the road; in some coaches they are made circular in their cross section, so that the entire weight of the carriage presses on a mere point; should the materials be soft, such wheels cut their way into the road like a sharp instrument. The owners of waggons, too, have adopted a similar plan. Mr. Macneil states that the actual bearing part of the tire of apparently broad-wheel waggons, is reduced to three inches by the contrivance of one band of the tire projecting beyond the others.

"With Steam, on the contrary, a certain amount of adhesion to the roads is required to give effect to the action of the machinery, or the wheels would slip round, and make no progress. It appears of little importance, therefore, so far as relates to the engine, whether the requisite amount of friction be spread over a broad surface of tire, or be concentrated to a small point; but as the wheels, by being too narrow, would have a tendency to bury themselves in every soft or newly-made road, and thus raise a perpetual resistance to their own progress, it actually becomes an advantage to adopt that form, which is least injurious to the road. The proprietors, who have been examined on this point, seem to be quite indifferent as to the breadth of tire they may be required to use.

"These considerations have convinced the Committee

that the tolls enforced on steam carriages have, in general, far exceeded the rate which their injuriousness to roads, in comparison with other carriages, would warrant; they found, however considerable difficulty in framing a scale of tolls applicable to all roads, in lieu of those authorized by several local acts.

"Mr. Gurney has delivered in a scale of tolls, graduated according to weight and width of tire of the wheel, As this has been drawn up by a person interested in the success of steam carriages, it might have been expected to be more favourable to them. The Committee, however, have not adopted it, because of the difficulties and interruptions, which a fluctuating rate of toll would induce.

The only fair plea for charging tolls on such carriages, in proportion to their weight, is to prevent a load from being propelled or carried, which would permanently injure the road.

Experiments and Observations on Diverging Streams of Compressed Air. By Mr. T. Hopkins.

(From the Transactions of the Literary and Philosophical Society of Manchester.)

On the eleventh of October, 1824, Mr. Roberts affixed a valve to the aperture of a pipe, used as a waste pipe, for the purpose of regulating or equalizing the force of a blast of air which was blowing a furnace. To his surprize, however, he found that the valve, instead of being readily blown off by a strong blast, remained at a small distance from the aperture of the pipe, and was removed to a greater distance only by a considerable exer-

tion of the power of the hand. This singular phenomenon was witnessed by many gentlemen, members of this society, in the same week, and appeared to be viewed by them all, as equally new and extraordinary.*

Mr. Roberts made some experiments on his air-valve at the time, and various theories were then suggested to account for the adherence of the valve to the pipe. It was not, however, until the month of September in the present year, that I agreed to join him in making further experiments, a part of which, I now proceed to give.

A vertical section of part of the apparatus used is given in Plate I. fig. 6, where *a*, is a pipe, three inches diameter, with the aperture contracted to 2⅝ diameter, at *b*, *b*, and surrounded by a flange *c*, *c*, 10¼ diameter, to form a seat for a valve. On this seat was placed a circular disk or valve *d*, *d*, six inches diameter, with a pin in its centre, by means of which it was left at liberty to rise or fall freely, and kept at the same time perpendicular to the aperture.

The valve was attached to one end of a scale beam by a string, and balanced by weights placed in a scale *e*, attached to the opposite end of the beam. The valve being thus placed on the seat without any weight of its own to press downward, the stream of compressed air was admitted into the pipe *a*, when the valve *d*, rose from the flange or seat *c*, 1-32nd of an inch, and there remained stationary. Thirteen ounces, avoirdupoise weight, were now put into the scale *e*, which raised the valve to 1-12th of an inch above the seat. Twenty-six ounces raised it to 1-8th of an inch, and thirty-two ounce raised it to 1-4th of an inch, but any weight beyond this last caused the valve to fly abruptly off.

It thus appeared, that when the valve was raised from its seat

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* Monr. Clement, of Paris, was said to be in Manchester at this period, and saw the air-valve adhere to the pipe, yet he afterwards, it appears, represented the discovery to have been made in France long subsequent to the time he saw it at Mr. Roberts' works.

a quarter of an inch, there was the greatest difference between the force of the issuing current of air pressing against the *under* side of the valve, and of atmospheric pressure on the *upper* side of the valve. The pressure of the atmosphere was greater than the force of the issuing stream of previously compressed air, a weight of thirty-two ounces being requisite to establish an equilibrium.

That we might ascertain what was the state of the stream of air under the valve, in different parts of it, four double syphon tubes were procured, and proper quantities of mercury being put into them, they were inserted in holes made through the valve at certain distances from each other, as shown in Figs. 6, at 1, 2, 3, 4. The inserted limbs of these tubes being thus left exposed to the action of the stream of air, the compressed air was again admitted into the pipe *a*, and the valve rose as before, 1-32nd of an inch.

The tube 1, in that part of the valve *d*, which was over the aperture *b*, had the mercury in it $1\frac{1}{2}$ inches higher in the *outer* than in the inner limb, and consequently shewed a pressure from the compressed air below it, above atmospheric pressure, equal to $1\frac{1}{2}$ inches of mercury. The tube 2, which was near to the aperture *b*, but over the inner edge of the seat *c*, shewed a rise of the mercury of 3-10ths of an inch in the *inner* limb of the tube, and consequently a pressure from the air below it *less* than atmospheric pressure by 3-10ths of an inch,—or a partial vacuum of 3-10ths of an inch of mercury. The tube 3, at the same time shewed a similar vacuum of 1-8th of an inch of mercury. The mercury in the tube 4, was undisturbed.

The valve with the four tubes in it was now raised above its seat from 1-32nd of an inch until it was $1\frac{1}{2}$ inches above the seat, by gradations of 1-32nd of an inch each, and the heights of the mercury in the tube, were noted at each step, distinguishing by a *p*, or a *v*, whether they shewed pressure from below, or a partial vacuum, and thus a table of five columns

was formed. The first column shewed the height of the valve above the seat, and the other four columns, the heights of the mercury in the four tubes, and whether they indicated pressure or vacuum.

This table shewed, that the pressure from the stream below, on tube 1, continued at $1\frac{1}{2}$ inches of mercury, until the valve was raised from its seat to 1-16th of an inch above it; but from that elevation until it was raised to $1\frac{1}{2}$ inches from the seat, the mercury shewed a gradually diminishing pressure, and at that height the pressure was only 6-10ths of an inch.

Tube 2, shewed its greatest degree of *vacuum*, which was 1 and 8-10ths inches of mercury, when the valve was raised 3-32nds of an inch; from which point, as the valve was further elevated, the vacuum became less, until at a height of 3-8ths there was no vacuum,—the mercury in the two limbs of the tube being at the same level. On raising the valve from 3-8ths to $1\frac{1}{2}$ inches, this tube shewed an increasing *pressure* from the stream of air below, and at the least named height the pressure was 4-10ths of an inch of mercury.

The tube 3, shewed its greatest degree of vacuum to be 7-20ths of an inch of mercury, and it was when the valve was up 11-32nds of an inch. As the valve was raised higher, the vacuum became less, until at the height of $1\frac{1}{2}$ inches it was nothing.

In tube 4, the mercury began to shew a small degree of vacuum when the valve was raised 3-32nds of an inch; when it was up $\frac{1}{2}$ an inch the vacuum was $\frac{1}{4}$ of an inch, being its greatest degree; from this point the vacuum diminished, and when the valve was $1\frac{1}{2}$ inches high, there was very little difference in the levels of the murcury in the two limbs.

A similar course of experiments was gone through with a valve 8 inches diameter, with some small variations in the results, which were noted in another table; but the only one worth mentioning is, that while the 6-inch valve required a little more than 32 ounces in the scale *e*, to detatch it from its seat, the 8-inch valve required 48 ounces.

From a general view of the results thus obtained, it appeared that while the valve adhered to the seat, and remained at but a small distance from it, a circular stripe or flat ring of attenuated air was found between the valve and its seat, and near to the aperture *b*, the air at the same time in the parts further from the aperture becoming more dense, until close to the periphery, it became nearly of atmospheric density; but as the valve was raised, the ring of the attenuated air approached the outer part or periphery of the valve.

To find the form and nature of this ring, it now appeared desirable that the different heights of mercury in the same tube, indicating degrees of vacuum should be ascertained at small and equal distances, beginning at the edge of the aperture, and proceeding along a radial line to the periphery of the valve. To accomplish this, a moveable slide was dovetailed into the valve, and in this slide was inserted the lower limb of one of the double syphon tubes with mercury in it as before, shown at Fig. 7, where the tube is placed over the aperture, and indicates a pressure from the compressed air of $1\frac{1}{2}$ inches of mercury.

This valve being placed on the seat, the slide *f*, *f*, was moved until the tube came over the seat, and the distance of the tube from the edge of the aperture was noted when the mercury first indicated a slight degree of vacuum. From this point the slide, and consequently the tube, was drawn outward 1-32nd of an inch, and the height of the mercury indicating vacuum again noted. In this way, by stages of 1-32nd of an inch each, the tube was drawn to the outer edge or periphery of the valve, and at the height of the mercury noted at each stage. The different heights of the mercury in all these stages, with the exact places of the tube at the times, were then marked by dots on paper, and these dots being connected by lines, we obtained the curve represented in Fig. 8. In this diagram *g*, shews the point at which the vacuum was first indicated, and the line from *g*, to *h*, represents the increase of the degree of vacuum, until at *h*, it is $1\frac{3}{4}$ inches of mercury. From this point the reduction of the degree of vacuum is seen by the curve from *h*, to *i*. The straight line *k*, a little

lower down, represents the pressure which the mercury shewed when the tube was over the aperture.

The valve was now raised higher from its seat, and the tube moved as before, and data obtained for the formation of other curves. When the valve was 3-16ths above the seat, the tube being placed over the aperture, shewed a pressure of only one and 4-10ths of an inch of mercury; but the tube being brought over the seat at a distance of 5-32nds from the edge of the aperture, shewed a vacuum of one and 8-10ths of an inch of mercury. From that point proceeding outward, the vacuum became less.

These experiments shewed, that until the valve was raised to a certain height above its seat, the under side of that part of the valve which was over the aperture, was exposed to a pressure of $1\frac{1}{2}$ inches of mercury more than atmospheric pressure; and the under side of all the rest of the valve, forming an outer stripe or ring, was exposed to a pressure less than atmospheric, or had a partial vacuum varying from one and 8-10ths of an inch of mercury up to atmospheric pressure, The superior pressure against the under side of the centre of the valve, must then have been counterbalanced by the inferior pressure against the under side of that of the valve which is nearer to the periphery,—and more than counterbalanced, for atmospheric pressure on the top of the valve was still so superior as to admit of a weight of 32 ounces being applied, before that pressure could be overcome and the valve raised.

Valves of various smaller sizes were now tried, and it was found that one of $4\frac{1}{4}$ inches diameter, was what may be called the neutral size over an aperture of $2\frac{3}{8}$ diameter; as, when it was balanced it would just adhere to the seat when the air was admitted, but the least weight placed in the scale raised it. Valves of any sixe smaller than this did not adhere to the seat, and would therefore be proper valves for such a pipe.

A conical valve was now procured, the greatest diameter of which was 6 inches on the upper side, and its least diameter was $2\frac{3}{8}$ inches, the same as the aperture, and its thickness $1\frac{1}{2}$ inches. This valve being fitted into a proper seat, required as many ounces

fitted to raise it from its seat as the flat 6-inch valve did. See Fig. 9.

Another conical valve, whose greatest diameter was the same as the flat neutral valve, $4\frac{1}{4}$ inches, its least diameter $2\frac{3}{8}$, and its thickness 3 inches, was fitted like the preceding one, into a seat of equal thickness with itself. This valve, however, if less than six ounces in weight, was blown off by the blast. And thus it appeared, that a conical valve, may be less disposed to adhere to the seat than a flat valve, the diameter of the upper sides of both being the same. See Fig. 10.

A phenomenon, singular in appearance, was exhibited while using these conical valves. It became necessary to fasten a seat with a hollow cone to the flange, and, in the experiments, the issuing stream of air was made to pass between the cone and its seat. But when this seat was liberated from the flange, and the stream of air suffered to flow, one stream rushed between the cone and the seat, and another between the seat and the flange. And thus the seat of the cone was held in its situation by the two streams of air, without being in contact with any thing else.

During the experiments, burning paper was placed on the valves, that the flame and smoke might shew whether there was any atmospheric current rushing down upon it. But it was only at the periphery that the flame was drawn down, until it came in contact with the stream of air issuing from under the valve, which cut off the flame as abruptly, as it could have been cut through with a knife, apparently from its force and coldness. On the valve the flame blazed in the way in which it ordinarily does, when their is no current of air acting upon it.

In endeavouring to account for these phenomena, it appeared, that the air in the aperture was projected or driven from the aperture as from a centre, in radial lines in every direction through enlarging circles, and thus became attenuated as it was thrown off from the centre, in the way that light is diminished according to its distance from its radiating point. For the purpose of ascertaining whether this was a correct view, or not, another experiment was made.

Instead of a circular valve, one of the form of a cross was used, six inches in diameter, of which fig. 11 is a plan. The centre of this cross valve just covered the aperture *b*, in fig. 6, and the four arms *l, l, l, l,* extended to the diameter of six inches. The four angular spaces between them left on the seat of the valve were covered with pieces of wood *m, m, m, m,* fitted to the spaces and fastened to the valve seat, leaving the cross valve at liberty, to be raised between them. By this contrivance, the compressed air, on issuing from the aperture, was confined to four separate streams of equal and uniform breadth, which could not diverge, but passed under the cross until they escaped at the ends of its arms. The tubes with mercury, as in Fig. 6, having been inserted in the arms shewed not more than 1-8th of an inch vacuum in any part of the arms, and less towards their outer extremities; and this small vacuum probably was the result of some air making its way under the angular pieces *m*.

The cross was now raised enough to leave considerable spaces for the stream to expand from its previously compressed state, and to become rarified, but no greater attenuation was indicated by the mercury. And thus it appeared, that when there was but little space, only 1-32nd of an inch, under the circular valve for the air to be projected into, there was an attenuation, or partial vacuum, of $1\frac{3}{4}$ inches of mercury, but when the cross valve was gradually raised from 1-32nd to the height of half an inch from the seat, and when of course there was ample room for expansion, not more than 1-8th of an inch vaccuum was indicated.

From these various phenomena it appeared that the vacuum under the circular valve was produced by the spreading of the air from a smaller to a larger circle, immediately after it left the aperture. For on the air being prevented from spreading by the pieces of wood, *m*, Fig. 11, when fastened to the seat of the valve, the vacuum nearly disappeared in the streams under the arms of the cross valve; but by attaching the angular pieces to the cross valve, and suffering both to rise together, the full vacuum of $1\frac{3}{4}$ reappeared as with the circular valve.

When the circular valve *d*, in Fig. 6, is placed on the seat, there is stagnant atmospheric air within the aperture *b*. On the condensed air being admitted into the pipe *a*, the stagnant air is put into motion, and before it can overcome the inertia of the valve, is forced between the outer parts of the valve and its seat. The air, while being thus forced, is, however, compelled tc diverge from a circle, whose diameter is 2 and three-eighths to one of a larger diameter, and is consequently dilated and attenuated. The impulse given by the compressed air on its first admission to the stagnant air in the pipe, causes the stagnant air to commence the process, but the compressed air follows instantaneously, and through the force with which it is impelled by the original moving power, is projected under the alve, and there forced to diverge with a velocity proportioned to the amount of the projectile force.

The projectile force acting through the stream of compressed air, and the peculiarly shaped and confined space through which the air is driven, are then the causes of its dilatation, until its degree of rarity is beyond that of the atmosphere, when atmospheric pressure on the upper side of the valve preponderates.

This view will, perhaps, be illustrated, by supposing the compressed air at the edge of the aperture, to be an elastic ring of two 3-8ths diameter, and that every part of this ring shall be struck with equal force from the centre, in a radiating direction to the circumference: by the time that the ring is projected to a sufficient distance to be a diameter of, say 4 inches, it will be stretched from a smaller to a larger circumference, and every part of the ring will be equally stretched or attenuated. A part of such a ring may be supposed to be represented in Fig. 12. It is not, however, necessary that the substance projected should be elastic, for if the ring were made of lead, the effect would be the same; or if grains of sand, or small lead shot, could, in like manner, be thrown from a centre, in al directions around, it is clear that as they were removed farther

from the centre, the grains or shot would be more distant from each other, or the stream of them would be more attenuated.

By a reference to the curve, Fig. 8, representing the degrees of vacuum, it will be seen that the circle of greatest vacuum is near to the aperture; and it may be inferred, that this fact is opposed to the theory of forced divergence, as on that theory it may be thought that we ought to have the greatest vacuum where the divergence was the greatest, and consequently near to the periphery of the valve. But it should be borne in mind, that the issuing stream of air has to overcome atmospheric resistance; and when, by diverging, it has become rarer than the atmosphere against which it is acting, the momentum requisite to keep it so is soon expended, and the stream under the outer parts of the valve, not having sufficient force to overcome atmospheric resistance from without, yields to it, and is brought to common atmospheric density. If the velocities of the stream under the different parts of the valve could have been ascertained by stages of thirty-seconds parts of an inch, in the same way that the degrees of vacuum were found by the heights of the mercury, it is presumed, that this point would have been established by experiment, instead of being left dependent on an inference.

The moving of the circle of greatest vacuum outwards, as the valve was elevated, does, however, exhibit evidence of the justness of the inference. When the valve was but little raised, the force of the stream was expended in diverging a part of itself, near to the aperture, but when the valve was considerably raised, the superior density of the stream was not confined to that part immediately over the aperture, but shewed itself also between the valve and a part of its seat. When it was raised half an inch, the same point point, *h*, which in Fig. 8, shews the greatest vacuum, indicated a pressure of a quarter of an inch of mercury, while the circle of greatest vacuum, had removed farther from the aperture.

It has been suggested, that the formation of the vacuum may be accounted for from the known tendency of a compressed spring,

when liberated, to fly beyond the point at which it will finally settle. But this action of a spring is only one instance of the operation of a general law of nature which is applicable to all bodies. When any body elastic or non-elastic is put in motion, its inertia causes it to continue in motion in the direction in which it has been impelled until its force is expended. The force of a liberated metallic spring is expended in the effort to overcome the tenacity of the substance of which it is composed, while the force of a cannon ball, fired into an earthen bank, is expended on the resistance presented by the earth; but it is projectile force that is expended in both instances.

In a short time after the phenomenon of the adherence of the air-valve was observed by Mr. Roberts, he ascertained, by experiment, without knowing that it had been done before, that *water*, when forced through a conical pipe, with considerable velocity, will draw out other water, placed below in an open vessel, if one end of a small tube is inserted in the conical pipe, and the other end is immersed in the water, in the vessel below : thus showing that water, an inelastic fluid, produced the same effect that air did, when rushing out in a stream, confined in a peculiar manner. And at the time this paper was going to press, water was by pressure from a column of considerable height, made to issue from a pipe with a valve placed over it, similar to what is exhibited in Fig. 6, when the valve, instead of being forced off by the issuing stream of water, was found to adhere to the seat, at a small distance from it. And when the apparatus was inverted, and the value consequently placed below the seat, upon the water being permitted to flow, the valve, instead of obeying the law of grovity and falling by its own weight, or of being driven off the force of the stream of water, adhered, with considerable firmness, to the seat.

Scotch Patents.

(*Continued from* p. 341.)

To Richard Edwards, of Dewsbury, in the county of York, leather and flock seller, for the invention of an improvement on, or a substitute for glass, sand, emery, and other scouring paper or substances.

To Joel Benedict Nott, of Schenectady, in the 'State of New York, now of Barry Street, St. James's, in the county of Middlesex, for the invention, communicated to him by a foreigner residing abroad, of certain improvements in the construction of a furnace or furnaces for generating heat, and in the apparatus for the applicotion of heat to various useful purposes.—Feb. 18.

To Bartholomew Redfern, of Birmingham, in the county of Warwick, gun-maker, for the invention of a lock, break-off, and trigger, upon a new and improved principle, for fowling-pieces, muskets, rifles, pistols, and small fire-arms of all descriptions.—Feb. 21.

To John Wallace, brassfounder in Leith, for the invention of an improvement or improvements upon the safety-hearths for the use of vessels.—Feb. 23.

To Joh2 Macdowall, of Johnston, near Paisley, for the invention of certain improvements on the pistons, valves, and boilers of steam-engines.—March 2.

To William Morgan, of York Terrace, Regent's Park, in the county of Middlesex, Esq. for the invention of certain improvements in steam-engines.

To Jeremiah Grime, jun. of Bury, in the county of Lancaster, copper-plate engraver, for the invention of a certain method of dissolving snow and ice on the trams or railways, in order that locomotive steam engines and carriages, and other carriages, may pass over railroads, without any obstruction or impediment from such snow or ice.

To David Napier of Warren Street, Fitxroy Square, in the county of Middlesex, engineer, and James and William Napier

of Glasgow, machinists, for an invention of "certain improvements in machinery for propelling locomotive carriages."—March 14.

To Robert Stephenson of Newcastle-upon-Tyne, in the county of Northumberland, engineer, for an invention of "an improvement in the axle and parts which form the bearings at the centres of wheels for carriages which are to travel upon edge railways."—March 24.

To Henry Pratt of Bilston, in the county of Stafford, miller, for an invention of certain kiln-tiles made and manufactured of clay, iron, and other metals and materials, for the purpose of drying wheat, malt, oats, and other grain, and for various other purposes, with the formation of the fire-place and kiln.

To Thomas Baily and Charles Baily, both of the town of Leicester, in the county of Leicester frame-smiths, for an invention of certain improvements in machinery for making lace, commonly called bobbin-net.—April 22.

To James Milne, of the city of Edinburgh, brass-founder, for an invention of an improvement or improvements on gas-meters.—April 27.

To David Napier, of Warren Street, Fitzroy Square, in the county of Middlesex, engineer, for an invention of certain improvements in printing machinery, with a method of economising the power applied to the same, which method of economissing power is also applicable to other purposes.—April 11.

To John Dickson, of Abbots Langley, in the county of Hertford, paper-maker, for an invention of an improved method of manufacturing paper by means of machinery.—April 29,

To John and James Potter, of Smedley, near Manchester, spinners and manufacturers, for an invention of certain improvements in machinery, or apparatus applicable to the spining or twisting of cotton, flax, silk, wool, and other fibrous materials. —May 2.

To William Rutherford, *junior*, of Jedburgh, writer and bank agent, for an invention of a combination or arrangement of apparatus or mechanism, to be used by itself, or applied to locks and other fastenings, for more effectually protecting property.—May 3.

To Samuel Mordan, of Manchester, in the county of Lancaster, in the kingdom of England, merchant, for an invention of an improved stretching machine.—May 18.

To Andrew Smith, of Princes Street, Leicester Square, in the parish of St. Martins-in-the-Fields, in the county of Middlesex, mechanist, for an invention of certain improvements in machinery for propelling boats, vessels, or other floating bodies on the water, and in the manner of constructing boats and vessels for carrying such machinery; part of which said improvements are applicable to water-wheels for driving mills or machinery, and also to windmills.—May 19.

To Thomas Knowles, of Charlton Row, in the county of Lancaster, cotton-spinner. for an invention of certain improvements in certain machinery, by aid of which machinery spinning machines, commonly called mules, are or may be rendered what is termed self-acting—that is to say, certain improvements in certain machinery, by aid of which machinery spinning machines commonly called mules, are or may be worked by power, without requiring the usual application of the strength of the spinners to give motion to the handles or wheels, and to such other parts of mules as are commonly worked by the strength of the spinners.—May 20.

To Samuel Lambert, of Regent Street, in the parish of St. James, Westminster, in the county of Middlesex, gold-lace-man, for an invention of an improvement in throstle spindles for spinning and twisting silk, cotton, wool, flax, and other fibrous substances.

To Sir Thomas Cochrane, Knight, commonly called Lord Cochrane, of Regent's Park, in the county of Middlesex, for an invention of an improved rotatory engine to be impelled by steam; and which may be also rendered applicable to other puposes.—June 2.

To Sir Thomas Cochrane, Kight, commonly called Lord Cochrane, of Regent's Park, in the county of Middlesex, for apparatus to facilitate excavating, sinking, and mining.—June 4.

To Andrew Ure, of Finsbury Circus, in the county, of Middlesex, M. D., for an invention of an apparatus for regulating the temperature in evaporization, distillation, and other processes.

To George Stephenson, of Liverpool, civil engineer, for an invention of an improvement in the mode of constructing wheels for railway carriages.—June 6.

To Alexander Craig, of Ann Street, St. Bernard's, in the parish of St. Cuthbert, and county of Mid-Lothian, in consequence of a communication made by a certain foreigner. residing abroad, of an invention of certain improvements in machines or machinery for cutting timber into vineers or other useful forms. —June 6.

To Michael Donovan, of the city of Dublin, druggist, for an invention of an improved method of lighting places with gas.—June 10.

To John Aitchison of Clyde Buildings, in the city of Glasgow, and county of Lanark, merchant, for an invention of certain improvements in the concentrating and evaporating cane juice solutions of sugar, and other fluids,—June 10.

New Patents Sealed.

To George Freeman, of Tewkesbury, in the county of Gloucester, lace manufacturer, for his having invented certain improvements in machinery for ornamenting and producing devices upon lace. — Sealed 22d Feb. — 6 months, for Inrolment.

To Alexandre Beattie Shankland, of Liverpool-street, in the city of London, in consequence of a communication made to him by a foreigner resident in America, for a new method of cutting, working, and planing of wood, minerals, and metals, by means of machinery.—23d Feb. 6 months.

To William Crofts, of Lenton, in the county of Nottingham, frame smith, for his having invented or found out certain improvements in machinery for making lace or net, commonly called bobbin-net lace.—23d Feb. 6 months.

To Ralph Watson, of York-place, Portman-square, in

the county of Middlesex, Esq. in consequence of a communication made to him by a certain foreigner residing abroad, for an invention of a certain improved lamp.—23d Feb. 6 months.

To Thomas De La Rue, of Crown-street, Finsbury-square, in the county of Middlesex, card maker, for his having invented certain improvements in making or manufacturing, and ornamenting playing cards.—23d Feb. 6 months.

To William Church, of Bordesley Green, near Birmingham, in the county of Warwick, gentleman, for his having invented or discovered certain improvements in machinery for making nails.—25th Feb. 6 months.

To Samuel Walker, of Millshaw, near Leeds, in the county of York, clothier, for his having invented or discovered certain improvements in gig machines for dressing woollen cloths.—1st March, 6 months.

To John Joyce, of Portland-road, in the parish of St. Mary-le bone and county of Middlesex, gentleman, in consequence of a communication made to him by a certain foreigner residing abroad, for an invention of a certain improvement or improvements in machinery for making nails of iron, copper, and other metals.—1st March, 6 months.

To Charles Beard, of Coggleshall, in the county of Essex, ironmonger, for his having invented or found out an improvement in the construction of cocks for taps for drawing off liquids.—1st March, 2 months.

To George Oldland, of Hillsley, in the parish of Hawkesbury, in the county of Gloucester, cloth worker, for his having invented or discovered certain improvements in machinery or apparatus for shearing, dressing, and finishing of woollen cloths, and other fabrics.—3d March, 6 months.

To William Wells, of Manchester, in the county of Lancaster, machine maker, for his having found out and discovered a new and improved method of making and constructing gig machines, otherwise called raising machines, or machines for raising the nap or pile of, and brushing and dressing woollen and other cloths.—8th March, 2 months.

To Thomas Petherick, of Penpelleck, in the parish of Tydwardrestle, in the county of Cornwall, mine agent, and John Filmore Kingston, of Islington, in the county of Devon, gentleman, for their having invented improvements in certain machinery and apparatus for separating copper, lead, and other ores from earthy and other substances, with which they are or may be mixed; the said improvement being applicable to the machinery for which a patent was granted by his late Majesty to the petitioner Thomas Petherick, bearing date the 28th day of April, 1830.—8th March, 6 months.

To Frederick Collier Bakewell, of Hampstead, in the county of Middlesex, gentleman, for his having invented certain improvements in machinery or apparatus for making or manufacturing soda water, and other aerated waters or liquids.—8th March, 6 months.

To Joseph Gibbs, of the Kent Road, in the county of Kent, engineer, and William Chaplin, of the Adelphi, in the county of Middlesex, coach maker, for their having invented certain improvements in wheeled carriages, and in the means of constructing the same.—8th March. 6 Months.

To Henry Warner, of Loughborough, in the county of Leicester, hosier, Charles Hood, of the same place, framesmith and setter-up, and Benjamin Abbot, also of the same place, framework knitter, for their having invented certain improvements upon machinery now in use

for making or manufacturing stockings, stocking net, or framework knitting, warp web, warp net, and point net.—8th March. 6 months.

To John Day, of Birmingham, in the county of Warwick, brass founder, for his having invented an improvement in the manfacture of cocks, used for the stopping and drawing off gass and water, and for other purposes for for which cocks are new used.—15th March. 6 months.

To Henry Brewer, of Surrey-place, Old Kent Road, in the parish of Saint George Southwark, in the county of Surrey, wire weaver, for his having invented or discovered certain improvements in machinery or apparatus for making paper.—15th March. 6 months.

To John Walmsley, of Manchester, silk winder, for his having invented a machine for cutting off fur or hair from beaver and other skins.—15th March. 6 months.

To Matthew Towgood, of Dartford, in the county of Kent, paper maker, for his having invented certain improvements in cutting paper.—15th March. 6 months.

To William Day, of Gate-street, Lincoln's Inn Fields, ni the parish of Saint Giles in the Fields, in the county of Middlesex, lithographic printer, for his having invented or discovered certain improvements in the construction of printing presses.—22nd March. 6 months.

To Bennet Woodcroft, of Manchester, in the county palatine of Lancaster, printer, for his having invented or discovered certain improvements in the construction and adaptation of a revolving spiral paddle, for propelling boats and other vessels on water.—22nd March. 6 months.

To William Alexander Brown, of Liverpool, in the county of Lancaster, merchant, and Herman Hendricks, of Passz, near Paris, in the kingdom of France, but now residing in Russel-street, Covent Garden, in the

county of Middlesex, gentleman, in consequence of a communication from a certain foreigner residing abroad, by which they are in possession of an invention of an improved method or methods of manufacturing the prussiates of potash and soda, and the prussiate of iron, also for the construction of certain apparatus, vessels, or machinery, to be used in the said manufacture, and a new or improved method of employing the said prussiate of iron, or other prussiates of iron, as a substitute for indigo, in dying all sorts of wools, and whether in the fleece, skin, spun, or woven into cloth, stuffs, or otherwise; also in dying silks, cottons, or linens, and in fact, all other sorts and descriptions of textile or other substances fit for the purpose of receiving colour of a blue, blue-black, black, greens, bronze, or any other colours for which indigo has hitherto been used, either as a ground work or auxiliary; and also for an improved arrangement of certain utensils and machinery, to be used in the said dying process.—22nd March, 6 months.

To Benjamin Cook, of Birmingham, in the county of Warwick, brass founder, for his having invented an improvement in the application of a material hitherto unused in the manufacture of paints, varnishes, and for various other purposes.—22nd March, 6 months.

To Peter Young, of Fenchurch-street, in the city of London, rope and sail maker, in consequence of a communication made to him by a foreigner residing abroad, for an invention of a new mode of manufacturing mangel wurzel, for the purpose of producing certain known articles of commerce.—22nd March, 6 months.

Chancery Lane, London. — Newton & Berry Office for Patents.

Meteorological Journal, 1832.

1832.	Thermo.		Barometer.		Rain in inches.	1832.	Thermo.		Barometer.		Rain in inches
	Hig.	Low	Hig.	Low			Hig.	Low	Hig.	Low.	
Jan. 26	42	25	29,80	29,77		Feb. 26	43	30	30,13	30,06	
27	36	25	29,97	29,82		27	41	28	30,09	30,05	
28	35	22	30,15	30,06	,35	28	37	29	30,13	30,12	
29	48	32	30,26	30,11	,025	29	43	30	30,18	30,05	
30	45	32	30,23	30,13							
31	43	35	29,98	29,81		March 1	42	30	30,10	30,20	
						2	45	34	30,24	30,22	
Feb. 1	45	32	29,49	29;25		3	44	32	30,25	30,13	
2	47	34	29,22	29,18		4	48	35	29,95	29,69	,1
3	43	26	29,70	29,40	,025	5	46	33	29,66	29,58	,275
4	53	37	29,86	29,74		6	46	32	29,49	29,34	,15
5	53	38	29,95	29,87		7	43	29	29,35	29,34	
6	52	35	29,79	29,60		8	38	25	29,38	29,39	
7	45	32	30,06	29,73	,075	9	48	23	30,10	29,93	
8	48	22	30,26	30,24		10	47	20	30,36	30,28	
9	50	29	30,33	30,25		11	45	30	30,34	30,16	
10	43	24	30,46	30,43	,05	12	47	30	29,99	29,90	
11	43	29	30,40	30,28		13	45	30	29,86	29,60	
12	43	28	30,26	30,10		14	50	32	29,52	29,32	
13	41	30	30,02	30,00	,05	15	43	31	29,66	29,29	
14	39	32	30,02	29,96		16	44	25	29,76	29,73	,05
15	39	20	30,00	29,94		17	51	30	29,65	29,42	,125
16	38	19	29,86	29,60		18	51	33	29,49	Stat.	
17	45	30	29,79	29,62	,025	19	50	32	29,76	29,66	,05
18	46	33	30,22	30,02		20	51	36	29,76	29,48	,25
19	42	30	30,22	30,20		21	57	33	30,08	30,00	
20	42	21	30,25	30,22		22	54	35	30,10	30,00	
21	48	29	30,23	30,19		23	54	43	29.92	29,87	
22	37	24	30,26	30,25		24	39	30	29,92	29,72	,075
23	37	25	30,30	30,18		25	48	30	30,14	30,04	,025
24	37	20	30,14	30,04							
25	37	21	30,07	30,00							

Edmonton. Charles Henry Adams.

CELESTIAL PHENOMENA, FOR APRIL, 1832.

D.	H.	M.	
1	0	0	Clock before the ☉ 3 m. 55 s.
1	0	0	☿ in perihelio
1	0	0	☉ rises 5 h. 33 m. sets 6 h. 27 m.
1	22	11	♀ passes the meridian
1	22	16	♃ passes the meridian
3	11	0	♀ in conj. with ♃ long. 14. in Aquarius, ♀ lat. 1. 17. S. lat. 58 S. diff. of lat. 20.
4	56	0	☿ passes the meridian
5	0	0	☉ rises 5 h. 25 m. sets 6 h. 35. m.
5	0	0	Clock before the ☉ 2 m. 44s.
5	3	34	☽ passes the meridian
6	8	0	☽ in perige
6	9	0	♂ in conj. with ♅ long. 14 in Cap. ♂ lat. 1. 16. S. ♅ lat. 40 S. diff. of lat. 36.
7	9	40	♄ passes the meridian
7	13	49	☽ in □ or first quarter
7	21	59	♃ passes the meridian
8	0	0	♀ in Aphelio
10	0	0	Pallas R. A. 22 h. 47 m. Decl. 3. 14. N.
10	0	0	Clock before the ☉ 1 m. 18 s.
10	0	0	☉ rises 5 h. 15 min. sets 6 h. 45 min.
11	0	0	occult. of Saturn, 1m. 3 h. 26m. Em. 4. h. 10 m. mean time.
13	1	12	☿ passes the meridian.
13	20	13	♂ passes the meridian.
14	16	0	Ecliptic oppos. or ○ full m.
15	0	0	Clock after the ☉ 1 m.
15	0	0	☉ rises 5 h. 6 m. sets 6 h. 54 m.
15	12	46	☾ passes the meridian
17	22	0	☾ in conj. with φ in Oph.
18	0	0	Vesta R. A. 8 h. 27 m. Decl 25. 6. N
18	19	53	♅ passes the meridian
19	14	36	☉ enters Taurus
20	0	0	Clock after the ☉ 1 m. 11 s.
20	0	0	☉ rises 4 h. 56 m. sets 7 h. 4 m.
20	19	45	☾ passes the meridian

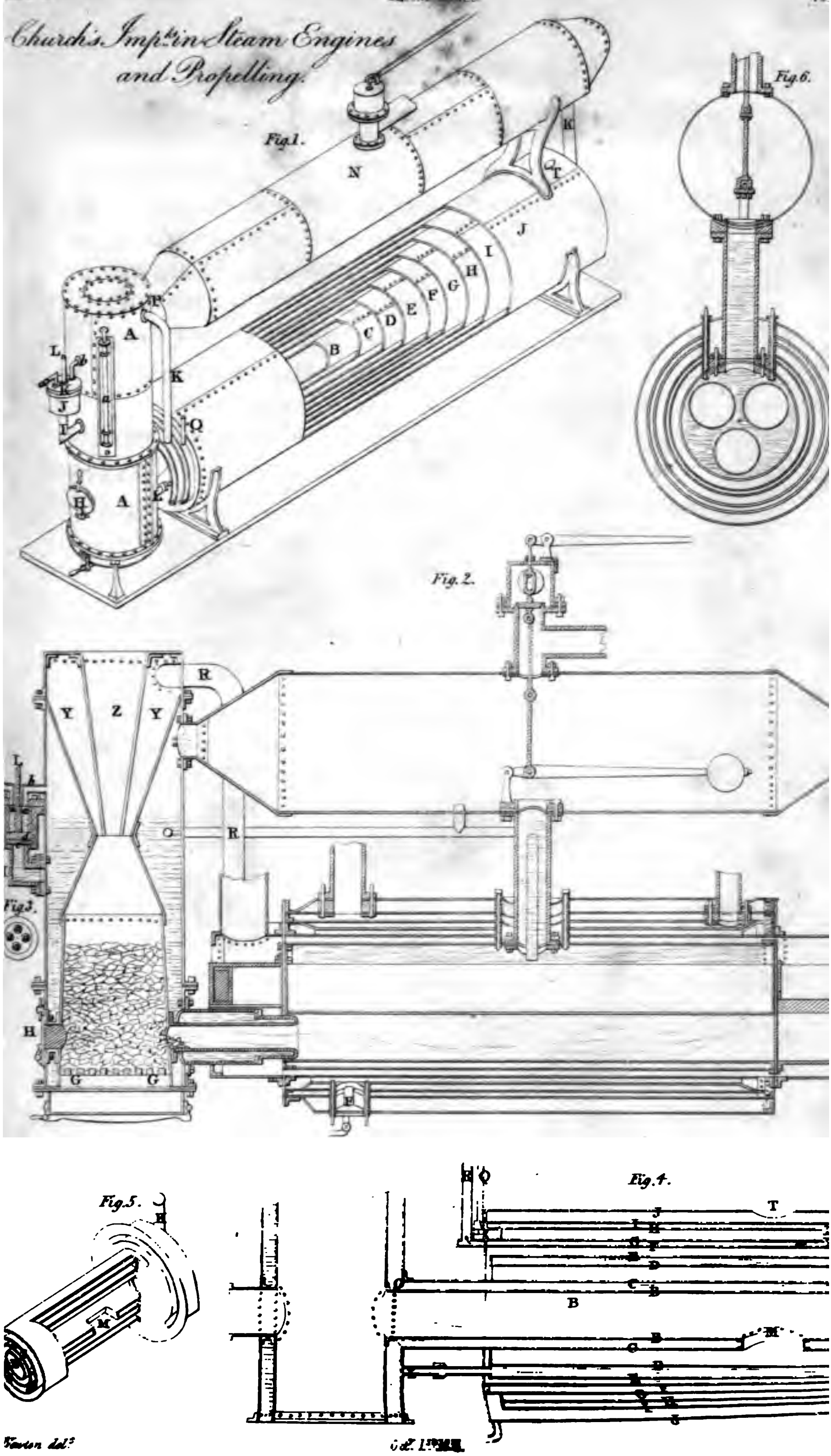
D.	H.	M.	
21	3	0	☾ in Apoge
21	19	23	♅ passes the meridian
22	16	12	☾ in □ or last quarter
22	0	0	Juno R. A. 9 h. 52 m. Decl. 11. 23. N.
23	22	0	in conj. with ♅ long. 18. in Cap. ☾ lat. 55 S. ♅ lat. 40. S. diff. of lat. 15.
24	0	0	☿ Stationary near γ in Aries
35	0	52	☿ passes the meridian
25	0	0	Clock after the ☉ 2 m. 10 s.
25	0	0	☾ in conj. with ♂ long. 1 in Aquarius ☾ lat. 1. 57. S. ♂ lat. 1. 32. S. diff. of lat. 25.
25	0	0	☉ rises 4 h. 47 m. sets 7 h. 13 m.
25	20	3	♂ passes the meridian
25	22	30	♀ passes the meridian
26	0	0	Juno R. A. 9 h. 54 m Decl. 11. 30. N.
26	10	14	☾ in conj. with ♃ long 19 in Aquarius ☾ lat. 3. 17. S. Jup. lat. 1. 2. S. diff of lat. 2. 15.
26	21	30	☾ passes the meridian
27	32	0	☿ in conj. with δ in Aries.
28	7	50	☾ in conj. with ♀ long. 14 ♓ ☾ lat. 4. 36. S. ♀ lat. 1. 32. S. diff. of lat. 3. 4.
30	0	0	Ceres R. A. 0 h. 56 m. Decl. 2. 46. S.
30	0	0	Clock after the ☉ 2 m. 56 s.
30	0	0	☉ rises 4 h. 38 m. sets 7h. 22 m.
30	0	28	☿ passes the meridian
30	3	40	Ecliptic conj. or ● new moon
30	15	28	☾ in conj. with ☿ long. 17. in Aries, ☾ at. 4. 56. S. Merc. lat. 1. 29. N. diff. of lat. 6. 25.

None of the eclipses of Jupiter's satellites are visible in London this month.

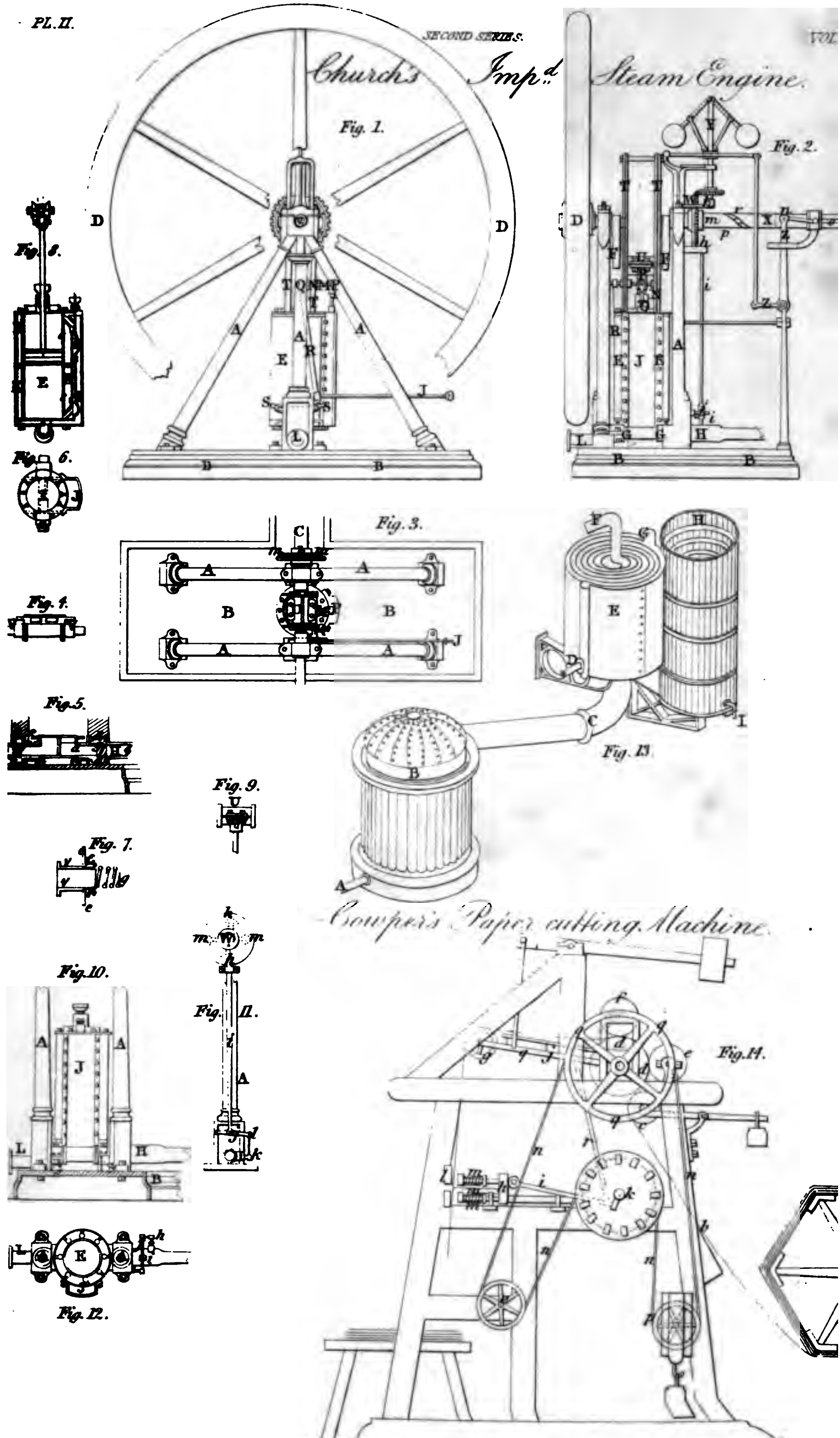
The waxing moon ☽.—the waning moon ☾

J. LEWTHWAITE.
Rotherhithe

Church's Impts in Steam Engines and Propelling.

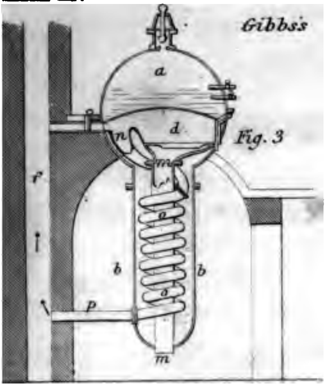


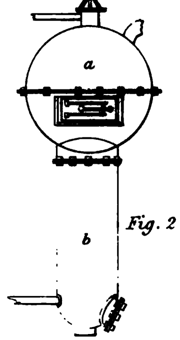
Tavton del.



T. Newton del.^t Oct. 1.st 1831. P.

Gibbs's Steam Boiler





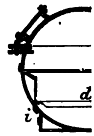
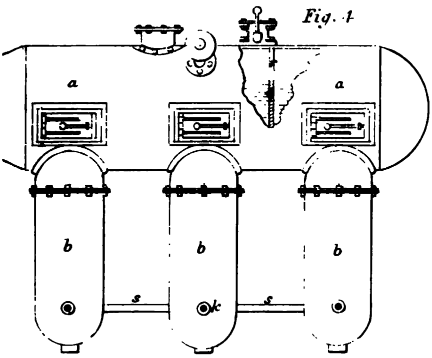
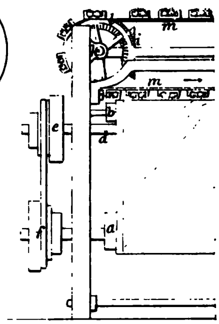


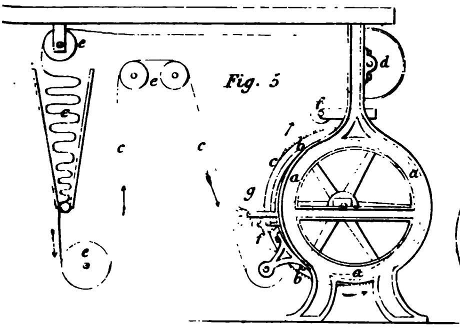
Fig. 1



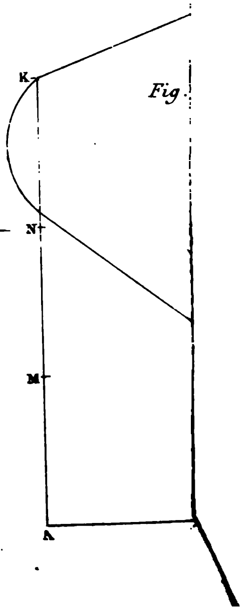
Ferrabees



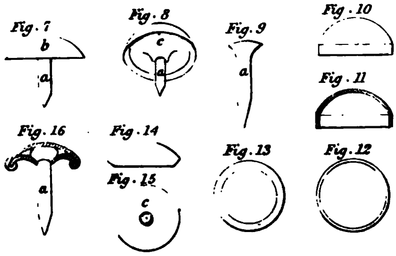
Charlesworth's & Mellors Gig Mill



Oldham



Prossers Impd Tacks



Molineux and Bundy

Fig.1. Fig.1A.

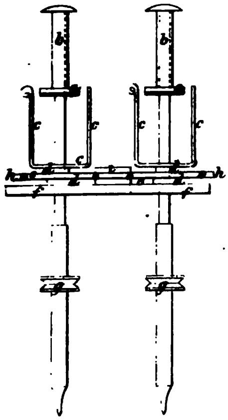


Fig.1.B.

Fig.2.

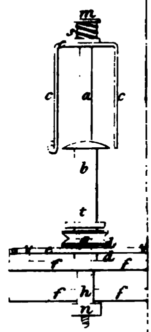


Fig.4.

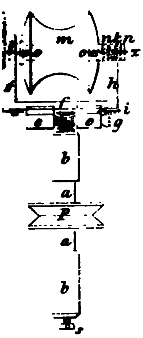


Fig.4A.

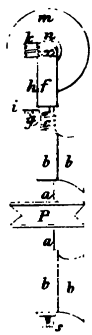
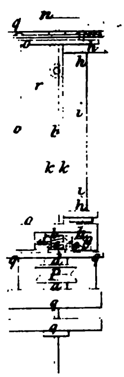


Fig.5.



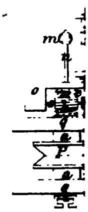


Fig.9.

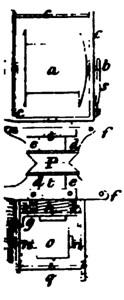


Fig.11.

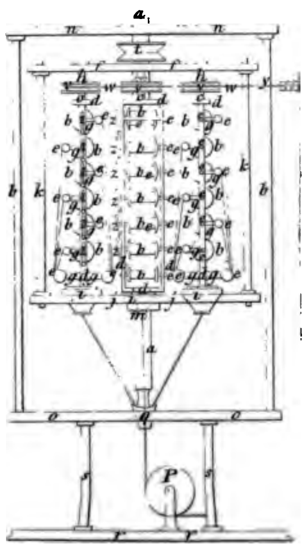


Fig.10.

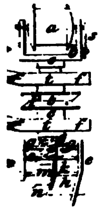


Fig. 3.

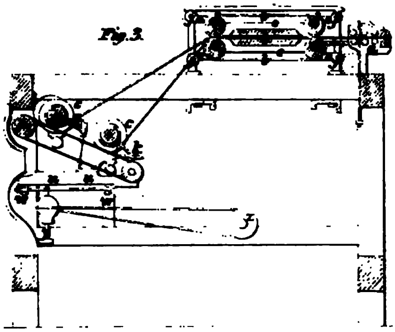
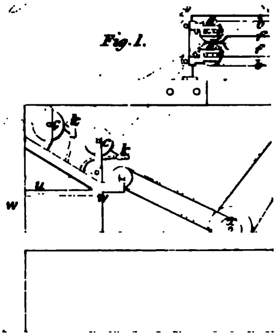


Fig. 1.



Turner's Pulp Strainer.

Fig. 2. D

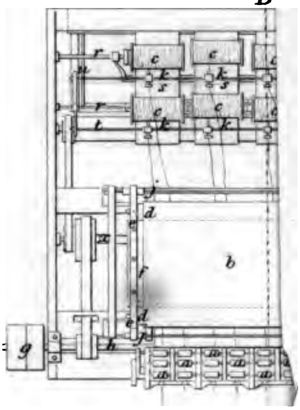


Fig. 5.

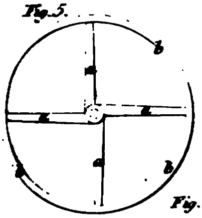


Fig. 6.

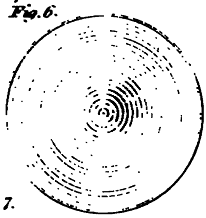


Fig. 7.

Fig. 9.

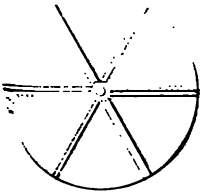


Fig. 8.

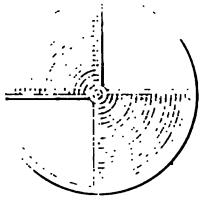
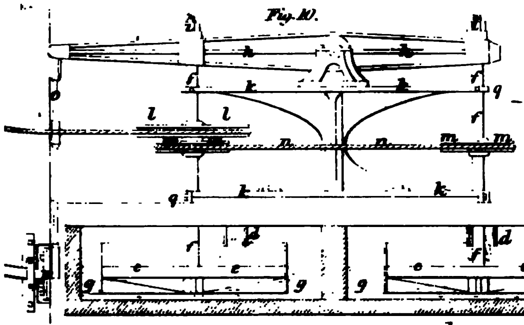


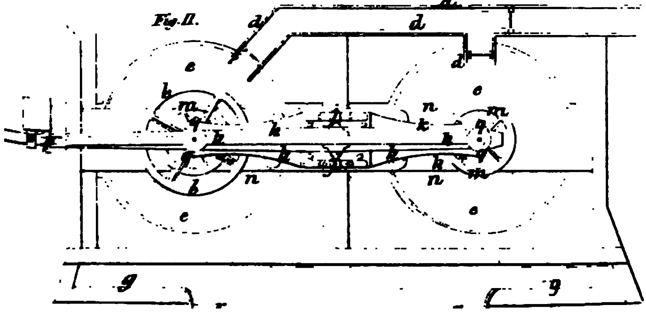
Fig. 10.



Lacy & Davis's

Fig

Fig. 11.



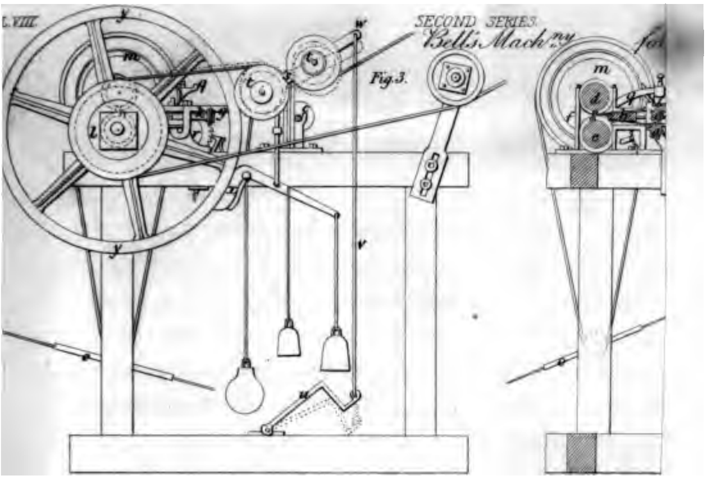
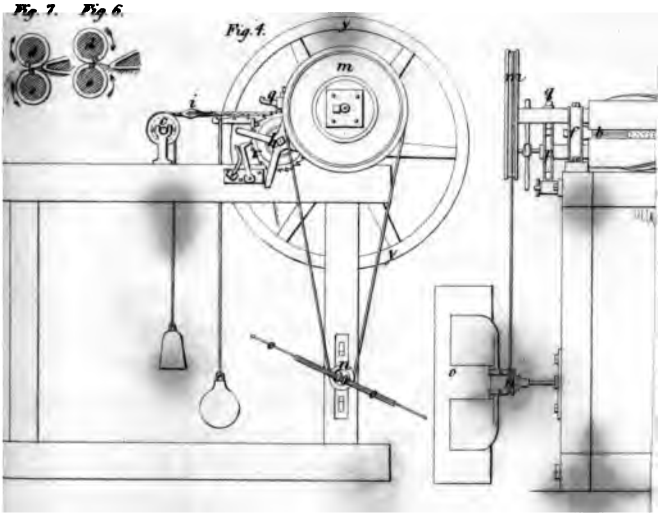


Fig. 7. Fig. 6.



Gaunt & Eckstein's Stove Grate.

Fig. 8.

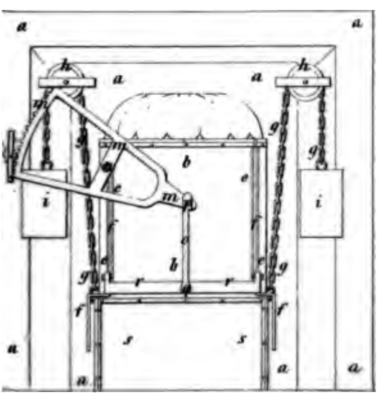
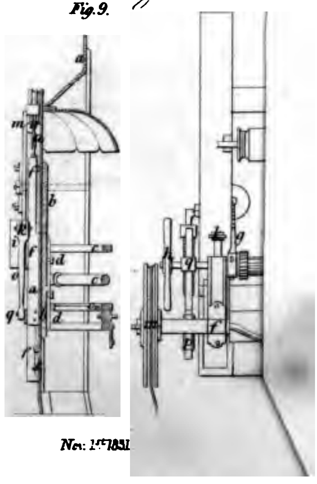


Fig. 9.

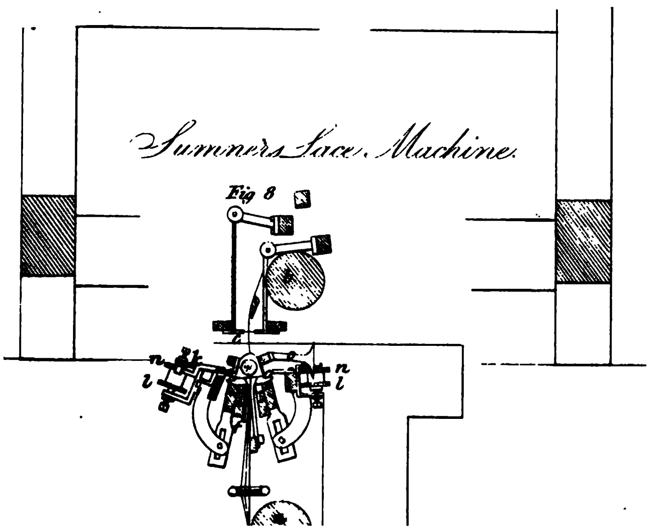


Newton del.

Nov: 1st 1831.

Summers Lace Machine.

Fig 8



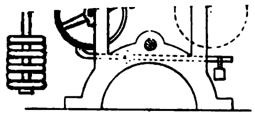
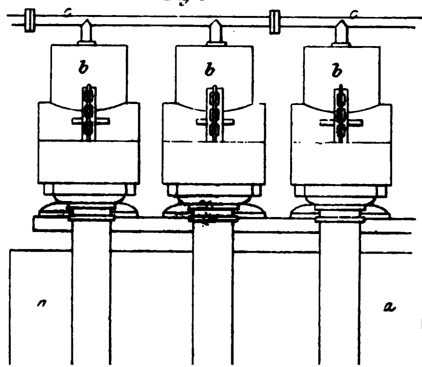


Fig 1



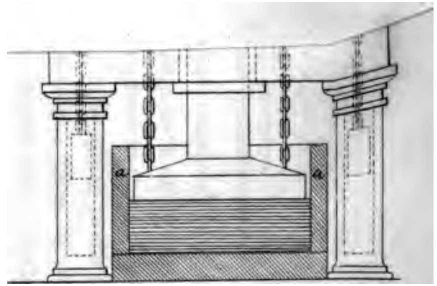
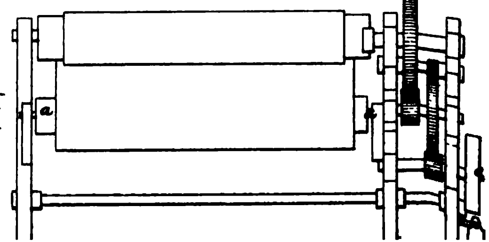
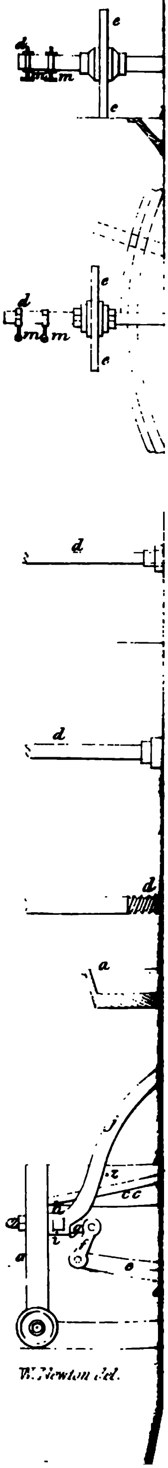


Fig 3

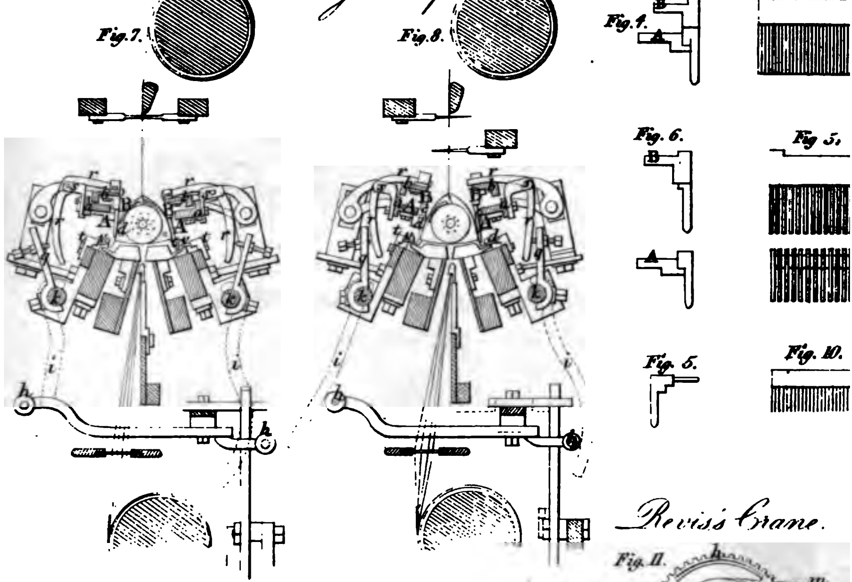


Vol. VIII.

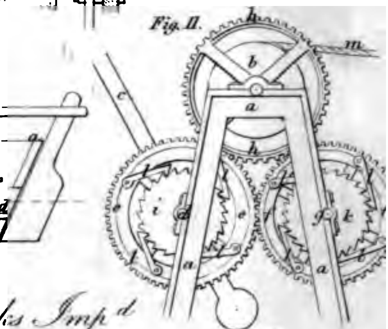


W. Newton del.

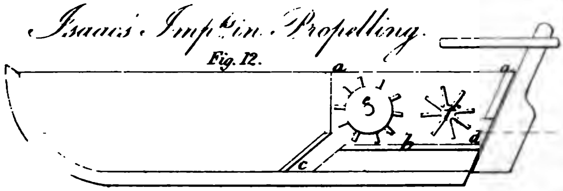
Bailey's Imp^d Lace Machinery.



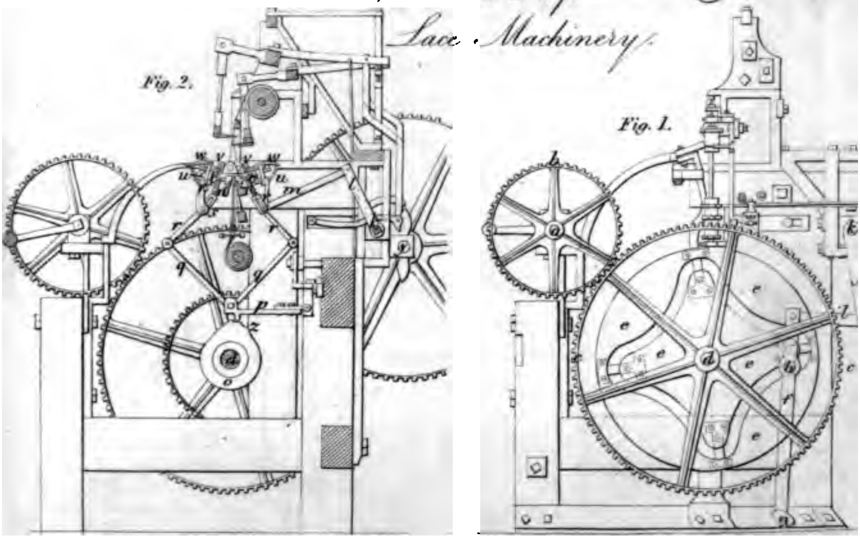
Reviss's Crane.



Isaac's Imp^t in Propelling.



Blackwell & Alcock's Imp^d Lace Machinery.



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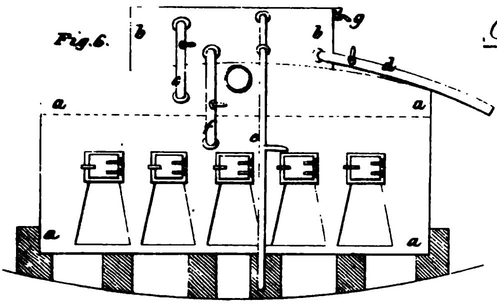
Seaward's Steam Boiler.



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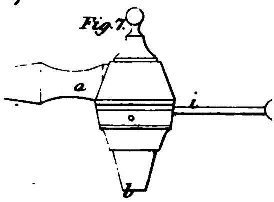

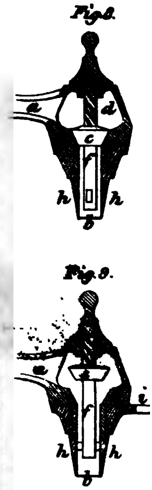

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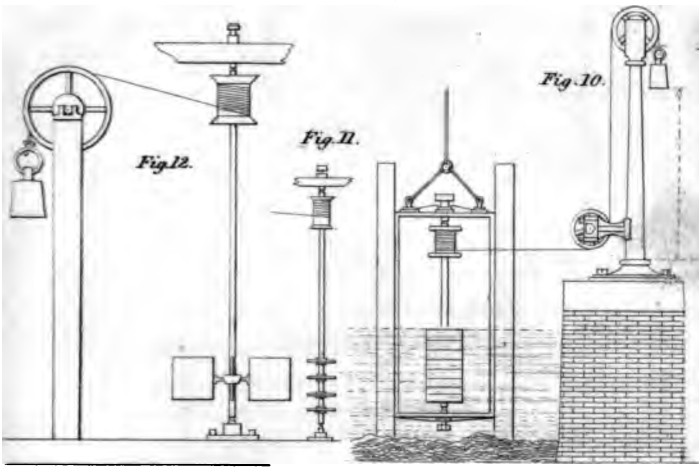

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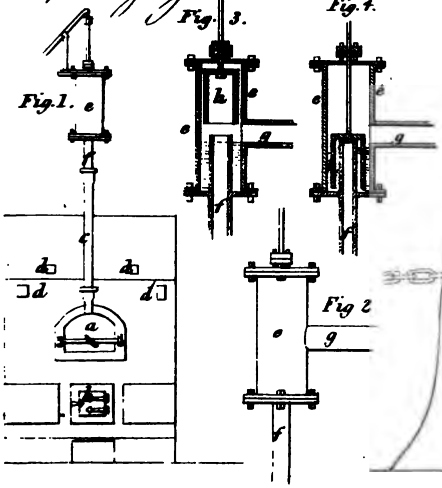

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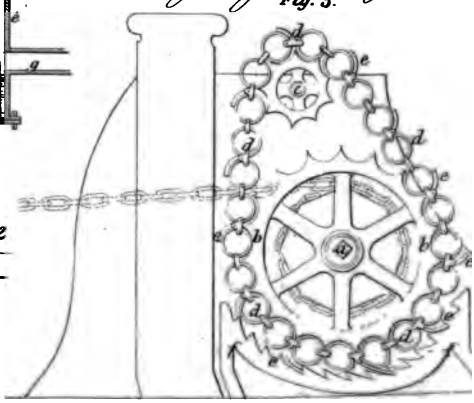


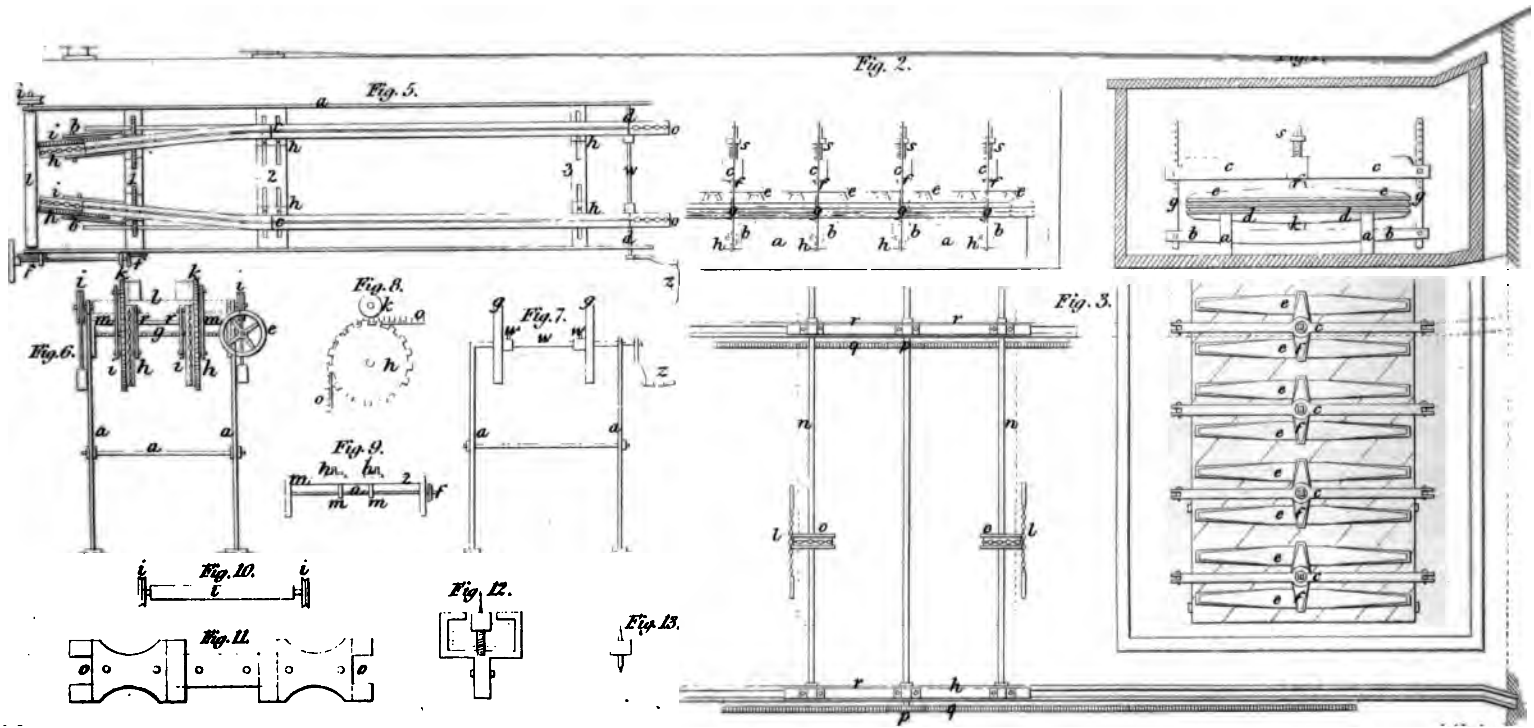


Fig. 9.

Fig. 8.

Fig. 9.

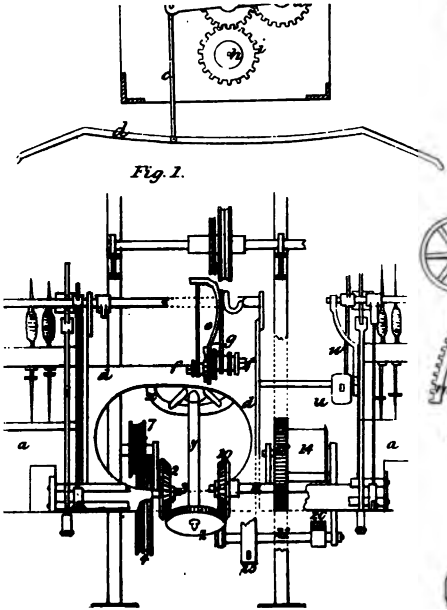
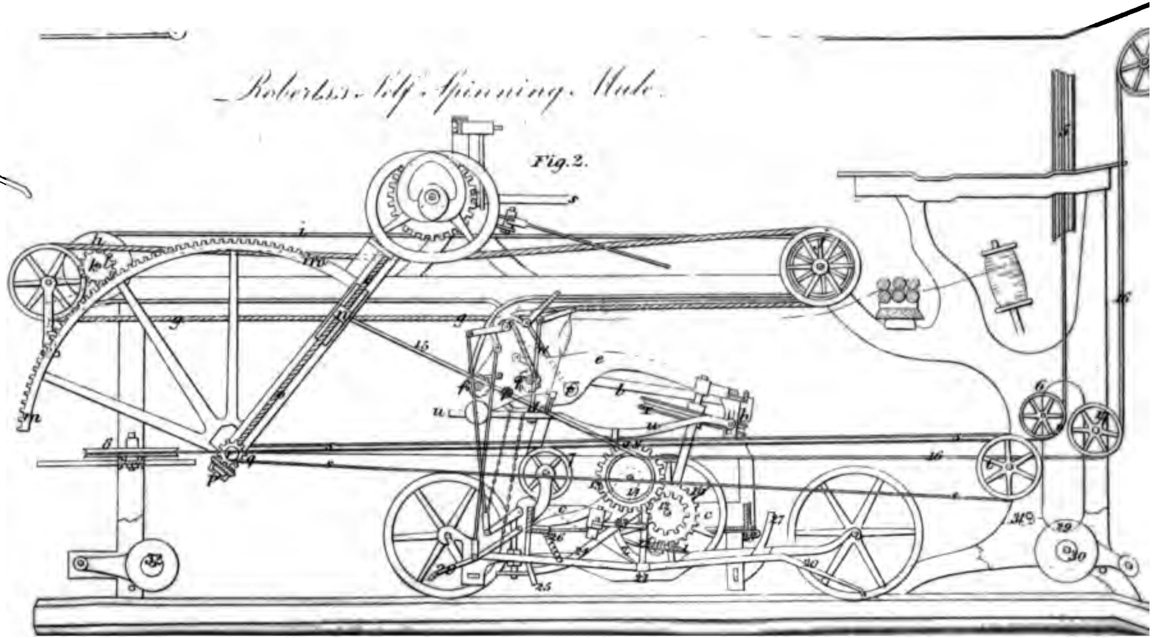


Fig. 1.

Roberts's Self-Spinning Mule.



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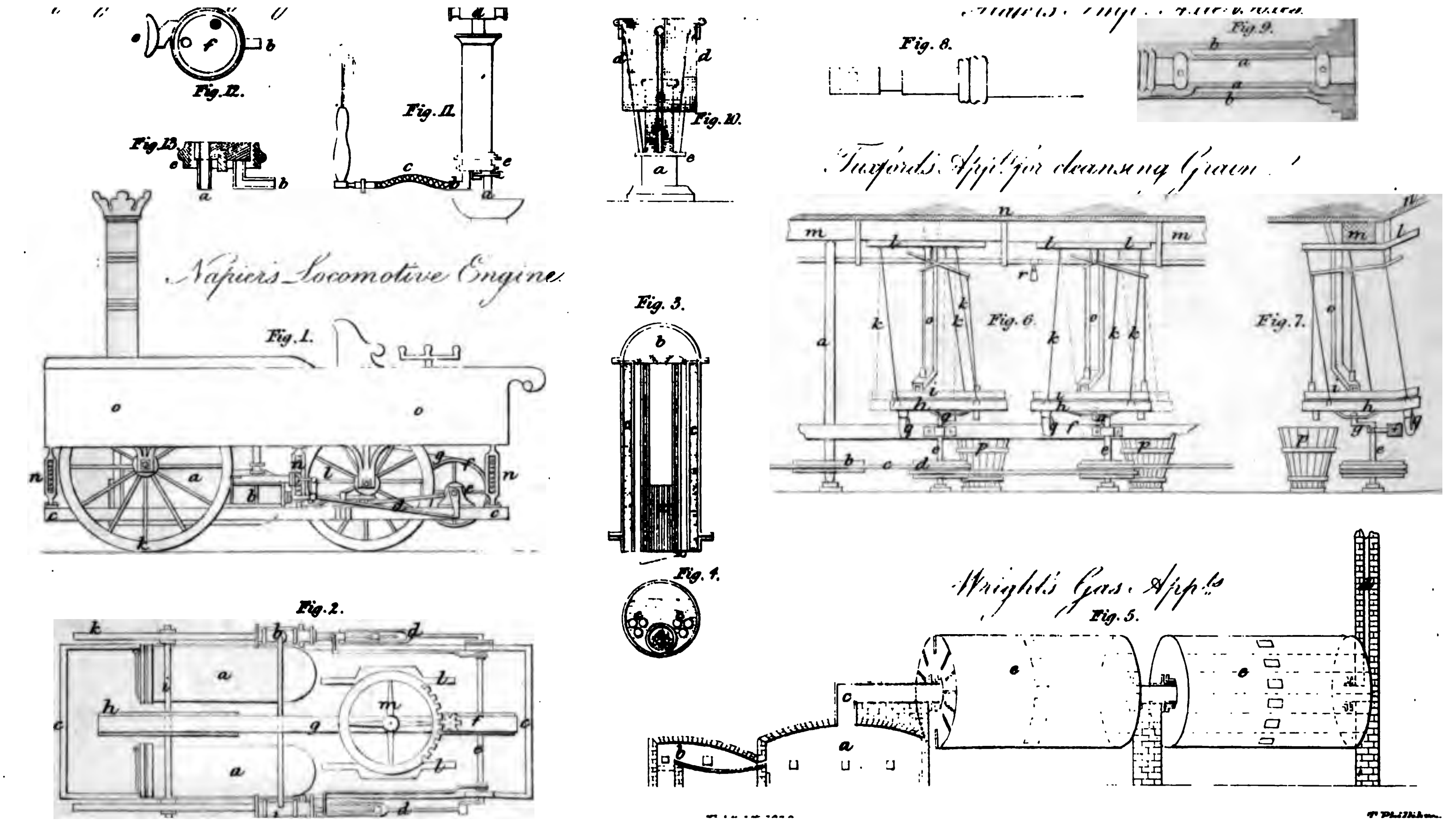

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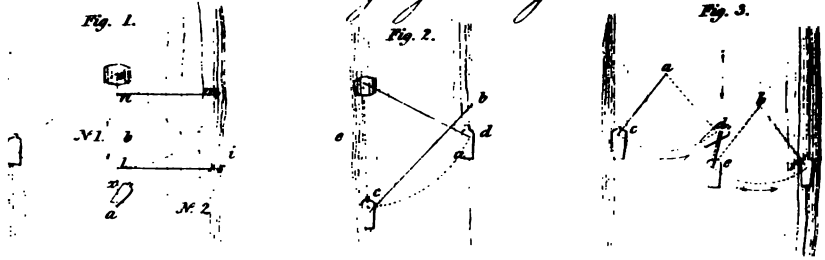

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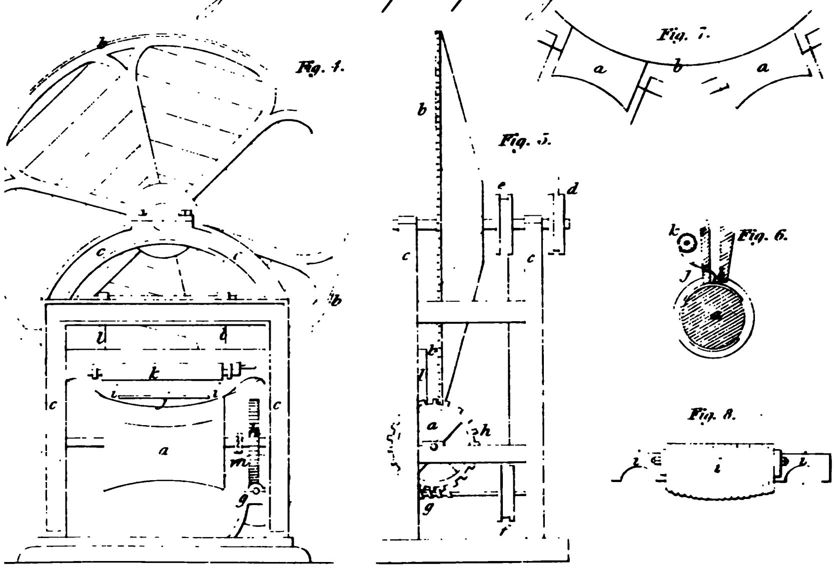

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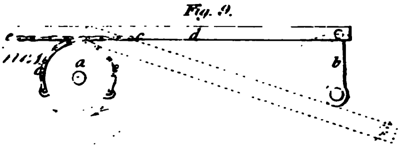

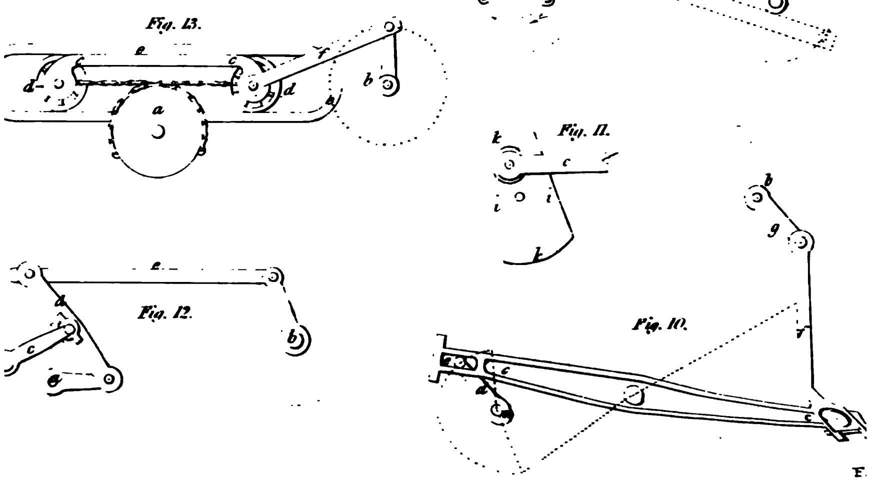

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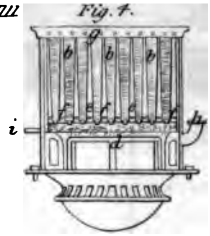

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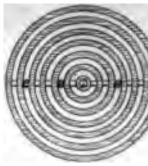
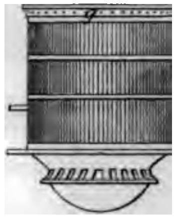




Impd. Cooking Appts.

Fig. 1.

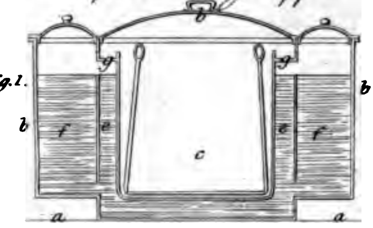
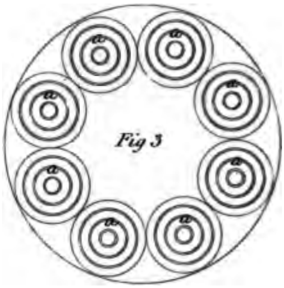


Fig 3



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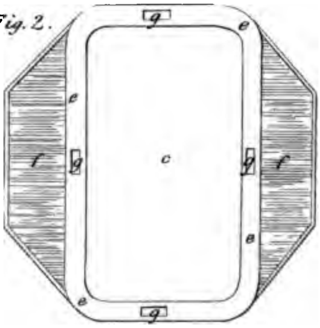

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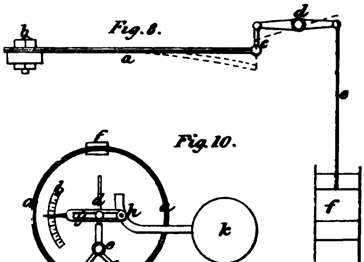

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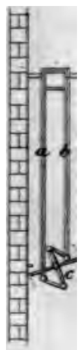

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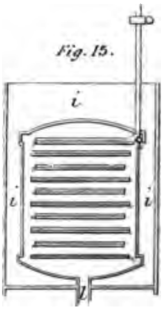

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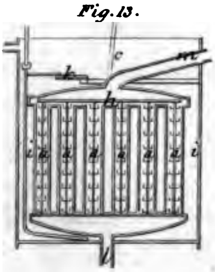

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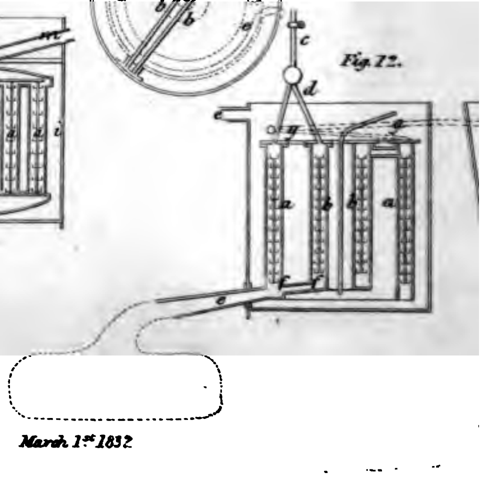

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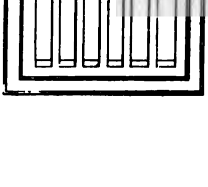

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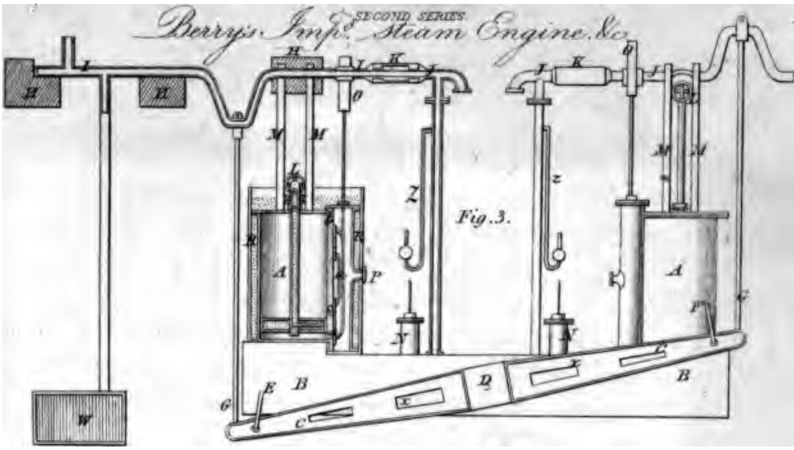
March 1st 1832



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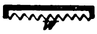

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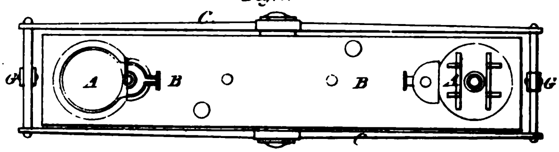

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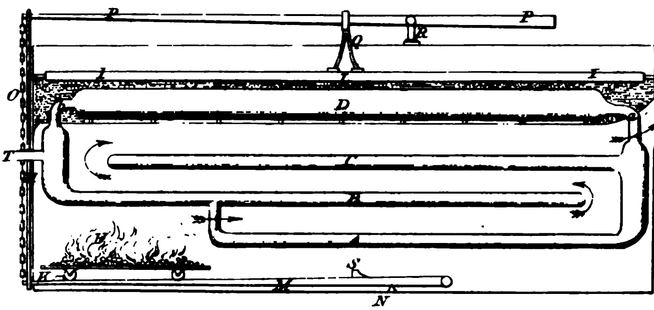

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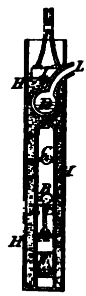

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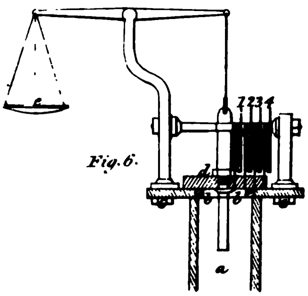

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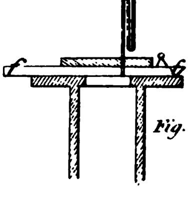

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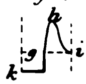

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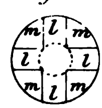

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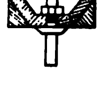

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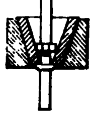

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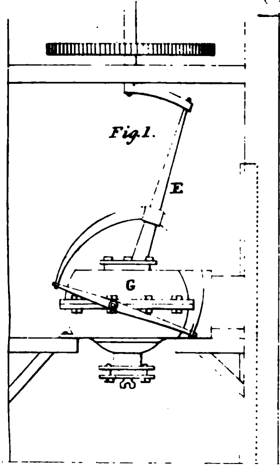

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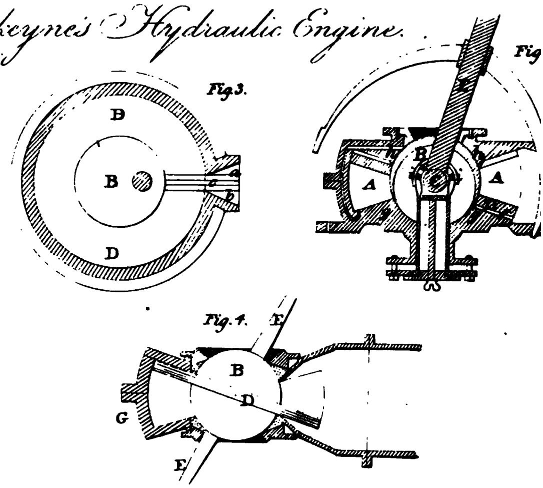

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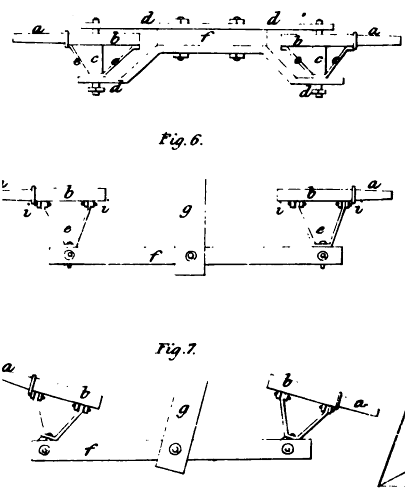

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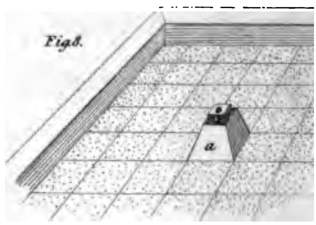

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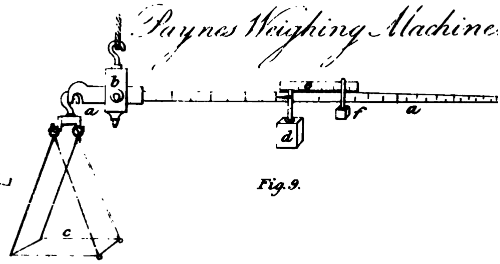

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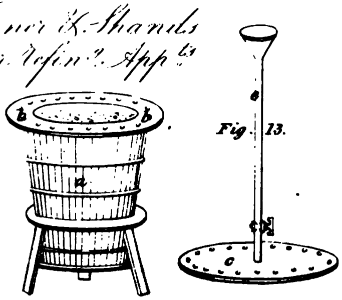

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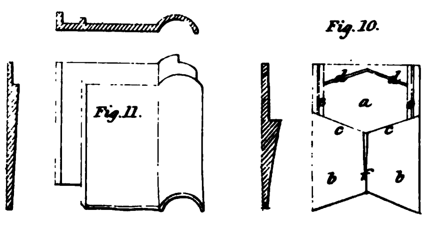

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